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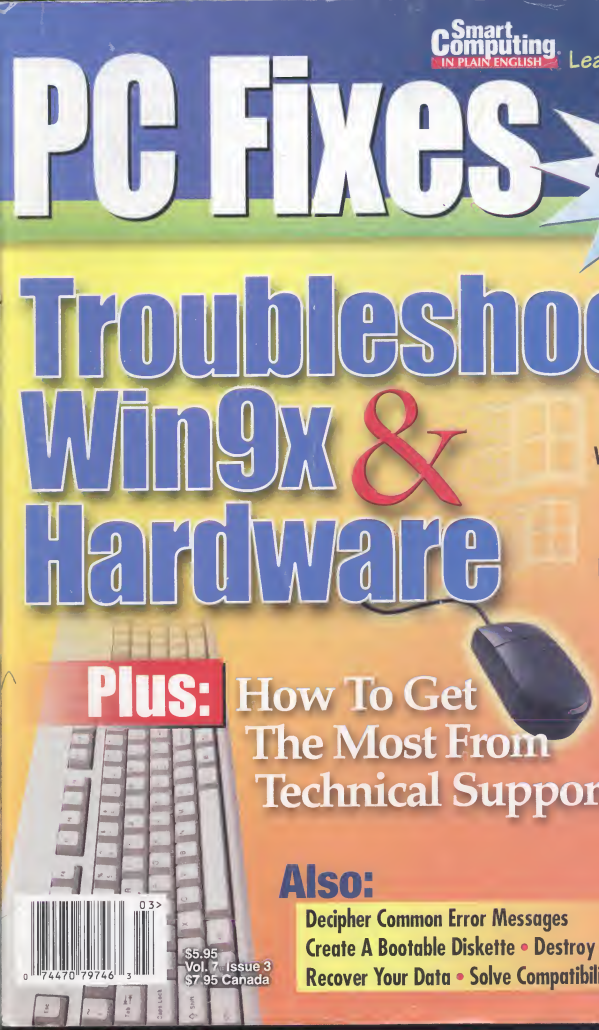

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If you think troubleshooting your computer problems is too time consuming and technical, you are wrong. Fixing everyday problems such as device conflicts, fuzzy on-screen images, and printer errors is a snap. This issue provides you with easy-to-use tips and techniques that will help you solve your present problems and prevent new ones.

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# Do-It-Yourself Troubleshooting

## Learn To Fix PCs On Your Own

Knowing how to use your computer is one thing. Knowing how to fix it is another. If you want to distinguish yourself from the rest of the chip-worshiping world, you need to be a troubleshooter. You must have that special combination of technical know-how and confidence that allows you to identify, diagnose, and solve PC problems when you encounter them. There's no shortcut to achieving this status as a user, but the time and effort are worth it. If nothing else, it will cut down on your calls to technical support.

**How To Fix Things.** Troubleshooting is the ability to identify, diagnose, and solve a recognized problem. It's also one of the oldest occupations known to humanity. You can bet that among the Neanderthals there reigned at least a few troubleshooters who were called upon to repair clunky wheels, spears that wouldn't fly straight, and other common problems of the prehistoric age. Even today, troubleshooters constitute a large portion of the workforce. Auto mechanics, for example, are professional troubleshooters. So, too, are electricians, plumbers, and furnace repair specialists. Consultants are troubleshooters, at least in part, and surgeons must prove themselves as anatomical troubleshooters when they have you under the knife.

In short, troubleshooters are people who know how to fix things. They're also expensive. The cheapest computer consultant will charge you $50 an hour to perform remedial troubleshooting tasks. Fortunately, it doesn't take a lot of expensive tools or years of apprenticeship to become a competent PC troubleshooter in your own right. All you need is an understanding of the general rules of troubleshooting, a few simple tools, this magazine, and a little confidence.

**The Rules Of Troubleshooting.** Some people say rules were made to be broken. That smarmy axiom doesn't apply when you're dealing with high-priced, high-voltage equipment that's expensive to replace and can kill you if you do something wrong. These rules of troubleshooting are not merely suggestions, but a carved-in-stone codex for dealing with high technology gone bad.

**Rule #1: Think!** That's all there is to the first rule of troubleshooting. Think about what brought your system to its present low. The vast majority of PC problems can be traced to a single event or source. Did you install a new hardware component? Did you install a new software application? Did you reconfigure the OS (operating system)? Did you try to edit the **Registry** (a database of critical system settings and user preferences in the Windows 9x, Windows NT, and Windows 2000 OSes)? Was the tree outside your office window struck by lightning? Did you recently lose electrical power to your office or home? Is there a charged battery in your portable computer? Is the computer plugged in? Are all the necessary components properly connected to the computer?

Think about all the possible actions that may have caused a near-fatal reaction in your PC. While you're at it, ask your co-workers, family members, and anyone else who has access to your computer to think about this, as well. Maybe Junior tried to load a **pirated** (illegally obtained) copy of the latest shoot-'em-up game on your home computer. Maybe the guy in the next cubicle thought he'd borrow your printer while you were at lunch. You never know who will turn out to be the numbskull that bombed your computer.

**Rule #2: Use common sense.** Exercise your common sense whenever you try to fix your PC. For example, it makes sense to turn off and unplug the computer before you start digging around in the circuitry. Similarly, it makes sense to move your computer if it's on a wet surface (believe us, dumber things have happened!). Also, take heed of any warning labels that you see. Remember that troubleshooting shouldn't be hazardous to your health.

You should also keep this rule in mind while you're handling the hardware. If two components don't want to slide together, for instance, common sense dictates that you look for impediments or verify that you have two compatible components. Common sense doesn't tell you to force the two parts together by whatever means necessary. Nor does it encourage you to use a hammer when removing a stubborn component. Remember that computers are fragile and must be handled accordingly.

The bottom line is this: If something doesn't seem right, it probably isn't, and you shouldn't try to make it so. Use common sense and call technical support for assistance.

**Rule #3: Recognize limitations.** The gist of this rule is that troubleshooters must recognize their own limits, as well as the limits of their PCs. As a rule, you can troubleshoot problems that pertain to installation, configuration, and usage issues. You can learn how to remove a disc from a jammed CD-ROM drive, for instance, or how to configure a photo-editing application to recognize your digital camera.

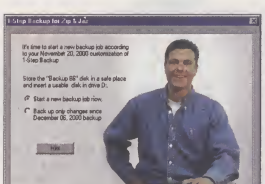
What you can't troubleshoot, however, are mechanical failures and manufacturing defects. You may be able to identify and diagnose these

problems, but it takes a trained engineer to rewire a motherboard or rig a new scanning mechanism for your scanner. If you face a problem you truly don't understand, it's OK to capitulate and call technical support or buy a replacement part.

In the same spirit, don't push your system further than it can go. You may be able to **overclock** (manipulate the processor to run faster than its advertised rating) a 700MHz Athlon processor to run at 800MHz, but there's no way you'll get a 166MHz Pentium to run at 800MHz. If you use your head and recognize such limitations, you will realize this before you even try to make it happen.

**Rule # 4. Keep your wits.** Specifically, don't panic or assume anything. Such behaviors only lead to mistakes and regrets. In a practical sense, this rule means that nothing is quite as bad as it seems, nor is it as good as you expect it to be.

Consider what happens when you encounter an unexpected problem while troubleshooting your PC. This is a problem on top of a problem. Nothing could be worse than that, right? Wrong. Panicking and forging blindly ahead with no idea of what you're doing in a foolish attempt to "fix things" will make matters worse. The best thing you can do in this type of situation is promptly stop what you're doing, remain calm, and call technical support. If you explain the situation to a competent support technician, we guarantee you'll receive a resolution.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**Never troubleshoot until you've backed up your crucial and irreplaceable data first. Use Windows' built-in backup utility or a proprietary utility, such as this one that ships with Iomega Zip drives.**

Don't get too smug when things are going great, either. Throwing away user's manuals or spare parts because you boldly assume you won't need them anymore is not the conduct of an intelligent troubleshooter. Find a large shoebox and fill it with your user's manuals, spare parts, extra mice, old installation discs and diskettes, shipping invoices, and anything else related to your computer system. Store the box in a place where the temperature doesn't get too hot or too cold. In the worst-case scenario, you'll have everything you need when disaster strikes your PC. In the best-case scenario, you can command a few more dollars from your used PC because you'll have all the original accessories.

**Tooling Around.** The only tool required by the aforementioned rules, which you should commit to memory before undertaking any tasks as a troubleshooter, is the one between your ears. Cerebral tissue will only take you so far, though. You also need a few tangible instruments to get you through some tasks.

**Screwdrivers.** A Phillips screwdriver is practically a must for removing expansion cards, storage drives, and anything else secured to the frame of your PC. It's unlikely you would need a flathead screwdriver. Some older computers

## Preventive Maintenance

A good troubleshooter knows the best time to fix a problem is before it happens. You may not be able to apply that knowledge in every situation, but you can prevent many problems from happening simply by instituting a strategy of preventive maintenance.

**Keep your PC clean.** Computers are susceptible to damage by the smallest of particles, including pet dander, smoke, and dust. You can minimize the build-up of these pollutants by:

- closing the windows in your office
- not smoking around the computer
- covering the printer and scanner with a plastic cover or cloth when they aren't in use
- keeping animals away from your PC
- removing diskettes from the diskette drive when it is not in use
- not allowing food or drink near your PC

Additionally, you should give your computer a good cleaning at least once a year. Use a vacuum attachment to clean out the power supply fan. Use a can of compressed air to blow dust off the PC's internal components. Wipe the computer case with a damp cloth (don't let water seep inside the computer, though).

**Maintain a comfortable work environment.** Extreme temperatures and humidity can damage fragile computer circuitry. For this reason, put your PC in a room where the climate is regulated.

**Use an uninterruptible power supply.** A UPS (uninterruptible power supply) is a personal generator that gives you a few valuable minutes to save your work and shut down the computer when a sudden power outage strikes. A UPS also serves as a surge protector. You can buy a quality UPS for as little as $30.

**Back up!** Backing up data is the best way to protect it from corruption, viruses, and drive failure. Iomega Zip drives ($99.95 and up; http://www.iomega.com) have emerged as a popular and affordable backup alternative for consumers and small businesses.

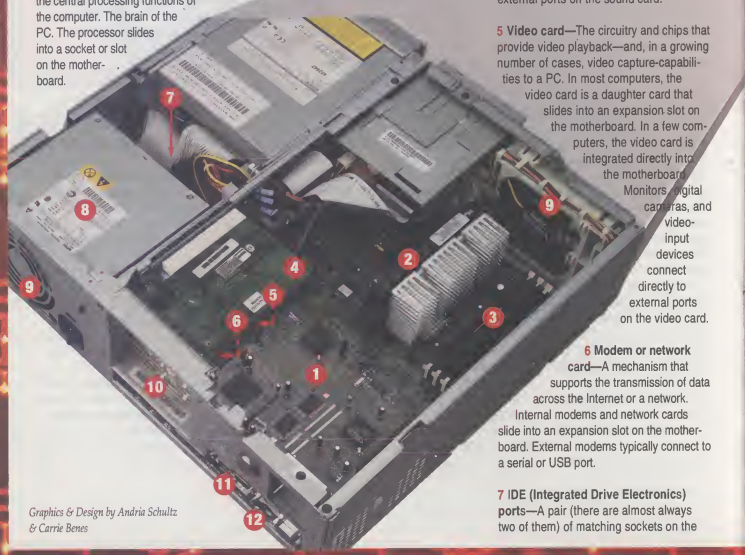
**Run drive maintenance utilities.** You can preserve the integrity of data on the hard drive by running two of Windows' built-in disk maintenance utilities. The first is ScanDisk, which checks for corrupted data and drive errors. You should run it once a week. The second is Disk Defragmenter, which organizes data efficiently on the drive. You should run it at least once every six months. Both can be accessed by opening the Start menu and selecting Programs, Accessories, and then System Tools.

**Use an antivirus application.** An antivirus application protects your data from harmful computer viruses. Get one—Norton Internet Security 2001 ($69.95; http://www.symantec.com) and McAfee VirusScan ($29.95; http://www.mcafee.com) are two of the most popular—and use it. □

# Inside Your PC

Just as a mechanic must go under the hood to work on a car engine or a doctor must make an incision to work on a diseased organ, PC troubleshooters often must dig inside the case of a PC to fix a troublesome component. This requires a certain familiarity with the guts of a personal computer, a familiarity you may not have. Fortunately, a computer is less complicated than an internal combustion engine or a human body.

These photos illustrate the appearance and placement of key components in a typical desktop computer. Before undertaking any troubleshooting task and opening your computer, we recommend using these photos as a guide to identify the placement of components within your machine. Your computer may differ slightly from ours, but once you recognize a few of the obvious components—the memory modules, the disc drive, the power supply, the expansion slots—finding the rest is a cinch.




*Graphics & Design by Andria Schultz & Carrie Benes*

**1 Motherboard**—The large circuit board that serves as the foundation of a computer's internal components. All other devices attach to it, either directly or via a cable. The motherboard attaches to the frame of the computer with screws.

**2 Processor**—A microchip that performs all the central processing functions of the computer. The brain of the PC. The processor slides into a socket or slot on the motherboard.

**3 Memory modules**—The repository of on-board temporary memory chips. RAM resides in the memory modules. Memory modules fit into memory slots on the motherboard.

**4 Sound card**—The circuitry and chips that provide audio capabilities to a PC. In most computers, the sound card is a **daughter card** (small circuit board that attaches to the motherboard) that slides into an expansion slot on the motherboard. In a few computers, the sound card is integrated directly into the motherboard. Computer speakers, microphones, and other audio components typically plug in to external ports on the sound card.

**5 Video card**—The circuitry and chips that provide video playback—and, in a growing number of cases, video capture-capabilities to a PC. In most computers, the video card is a daughter card that slides into an expansion slot on the motherboard. In a few computers, the video card is integrated directly into the motherboard. Monitors, digital cameras, and video-input devices connect directly to external ports on the video card.

**6 Modem or network card**—A mechanism that supports the transmission of data across the Internet or a network. Internal modems and network cards slide into an expansion slot on the motherboard. External modems typically connect to a serial or USB port.

**7 IDE (Integrated Drive Electronics) ports**—A pair (there are almost always two of them) of matching sockets on the

motherboard. Most consumer-oriented storage drives, including hard drives and disc drives, connect directly or indirectly to an IDE port. IDE ports are a built-in component of the motherboard. Another way that components connect to your computer is through a SCSI [Small Computer System Interface] port, although SCSI products are becoming less common due to the growing popularity of USB and IEEE 1394 (FireWire) technologies. An illustration of an internal SCSI Jaz drive installation is featured on the next page.

**8 Power supply**—The mechanism that provides electricity to the rest of the computer. The power supply attaches to the computer frame and connects directly to the motherboard via power cables. It has several smaller power cables, called **pigtails**, that must be connected to the power switch, as well as to the various components inside your computer. The power supply is capable of supplying power to your PC only when plugged in to an electrical outlet.

**9 Fan**—A cooling mechanism designed to keep a computer from overheating. It may be incorporated into the power supply or attached to the frame of the computer. The processor also may have its own smaller fan.

**10 USB (Universal Serial Bus) ports**—An external socket or sockets that accommodate USB-compliant devices. The USB ports are usually incorporated into the architecture of the motherboard, but may be installed as expansion cards.

**11 Serial and parallel ports**—External sockets that accommodate compliant input and output components, such as printers, modems, mice, and scanners, as well as storage drives. Serial and parallel ports are usually incorporated into the architecture of the motherboard, but also may be installed as expansion cards.

**12 PS/2 port**—Tiny, round external sockets that accommodate mice and keyboards. The PS/2 ports are incorporated into the architecture of the motherboard.

**13 Expansion slots**—A series of long, thin sockets on the motherboard. These sockets are designed to accommodate daughter cards, such as a sound card or internal modem. The expansion slots are part of the motherboard and come in several varieties, including ISA (Industry Standard Architecture) and PCI (Peripheral Component Interconnect).

**14 Additional storage drives**—Any other storage mechanism, such as a tape drive, Zip drive, or second hard drive, that is part of the computer system. Internal storage drives attach to the frame of the computer and connect to the motherboard via a cable that plugs in to an IDE or SCSI port. External storage drives, which are quite popular, typically connect to a parallel or USB port.

**15 Diskette drive**—A storage device that writes data to 3.5-inch diskettes. A diskette drive attaches to the frame of the computer and connects to the motherboard via a cable that plugs in to an IDE port. The mouth of the drive is accessible from the front of the PC.

**16 Hard drive**—The computer's primary mass-storage device. Data saved in the hard drive remains intact, even after the power is turned off. The hard drive attaches to the frame of the computer and connects to the motherboard via a cable that plugs in to an IDE or SCSI port.

**17 Disc drive**—An optical storage drive that reads data from—and in some cases, writes data to—a CD or DVD. An internal disc drive attaches to the frame of the computer and connects to the motherboard via a cable that plugs in to an IDE (Integrated Drive Electronics) or SCSI (Small Computer System Interface) port. The mouth of the drive is accessible from the front of the PC. External drives typically connect to a parallel or USB port.

**18 Mouse or trackball**—The primary pointing device for a computer system. The mouse or trackball lets you control the on-screen pointer. A mouse or trackball plugs in to the PC via a serial, PS/2, or USB port.

**19 Keyboard**—The primary data input device for a computer system. The keyboard typically plugs in to the PC via a serial, PS/2, or USB port.

may require a special tool, such as an Allen wrench. An unusual tool like this should come with the computer if it's required.

**Pliers.** A pair of needle-nosed pliers will help you grip small screws and remove plugs from tight sockets. You could use tweezers in a pinch. Small, nimble fingers also will work.

**User's manuals.** Get out that shoebox and find the user's manuals for the components you're working on. The users manual may provide step-by-step troubleshooting assistance. At the very least, it will tell you about any special considerations you need to keep in mind while you work.

**Startup diskette and installation discs.** It's a good idea to keep these key pieces of software around, even when you're troubleshooting hardware. You never know when you'll need to reinstall a **device driver** (software that lets a hardware component communicate with the rest of the system) or **boot** (start) the computer in DOS mode.

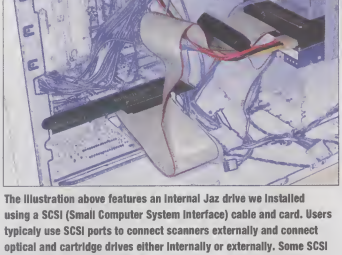
**Pen and paper.** Take notes while you're troubleshooting. Scribbling down something as simple as "red cable connects to right port" can make it much easier for you the next time you have to fix a similar problem. It's also a good idea to document when the problem occurs and what caused the problem. Technical support will want to know these things if you eventually have to call them. (By the way, if you call technical support, you should document the date of the call, who you talked to, how the problem was resolved, and the event number for the call.)

**The Internet.** Many hardware problems can be resolved simply by downloading a new device driver, software patch, or diagnostic utility. That's where the Internet comes in. If you can't figure out any other solution to a specific problem, visit the hardware manufacturer's Web site and see if they have a downloadable fix that will solve the problem for you. The site's support area also might offer step-by-step assistance for solving common problems.

To find a company address, Web address, or phone number, visit Hoover's Online (http://www.hoovers.com), and click Research Companies. On the next Web page, click the drop-down list next to Search, select Company, type the company name in the next field, and click Go. The resulting page should list one or more companies matching your search inquiry. Simply click the Capsule link next to the appropriate company name in the list of results, and another Web page will display on-screen with the corporate address, Web address, and related phone numbers.

**A telephone.** As a tool of last resort, the telephone is your outlet to technical support. Use it when necessary—no less, no more. If the phone number listed in the users manual is no longer valid or you can't locate your manual, visit Hoover's Online and follow the steps as described in the above paragraph to find a current phone number.

■ **Final Preparations.** The last thing you must do before embarking on any troubleshooting task is to prepare your computer for the experience. Do not skip the steps involved in this procedure. Doing so could cause great harm to your system or yourself. It would also make your job much more difficult.



**The illustration above features an internal Jaz drive we installed using a SCSI (Small Computer System Interface) cable and card. Users typicaly use SCSI ports to connect scanners externally and connect optical and cartridge drives either internally or externally. Some SCSI ports connect directly to the PC's motherboard, but users can add SCSI ports via a SCSI expansion card that plugs into a free PCI or ISA slot on the motherboard (as shown above).**

**Back up your data.** Making a backup copy of important data is a must. Without it, you risk losing your precious content if something goes wrong. Back up any data files you have created, including word processing and spreadsheet documents, databases, address books, personal finance records, and e-mail message folders. It's also a good idea to back up your system files, such as Autoexec.bat and Config.sys, before you edit them.

**Find an adequate work area.** Taking the computer apart involves the removal of screws, internal components, cables, and other parts that you don't want to lose. It also requires you to have your fingers dangerously close to fragile circuits, which can be destroyed by a single zap of static electricity. To avoid losing important pieces of hardware and minimize the threat of static electricity, you should find a work space that provides ample room and is away from carpets or rugs. Kitchen and workshop counters are ideal. If you drop something tiny on the floor, you can sweep it up with a broom. Of course, you can stay seated at your desk if you're only working on the OS.

**Gather your tools.** Gather everything you need and place it on the counter or desk next to you before you start. You risk becoming the victim of disaster if you leave your system open and unprotected while you hunt for a screwdriver. All it takes is one curious four-year-old and a cup of milk to destroy your motherboard, or one devious co-worker and a sense of mischief to screw up a Windows installation.

**Turn off the system.** If you're going to handle any of the hardware components, you first should shut down the computer, turn the power off, and then unplug it from the wall. Unplug any components that have their own external power cords, as well. This may include the printer, scanner, external modems and storage drives, and speakers. If you're simply reconfiguring the OS, then you must leave the computer turned on and powered up.

**Ground yourself.** Once you remove the cover from your PC, you become a threat to the system. The weapon you carry is static electricity. Yes, you may be a carrier, even if you're standing on tile, wood, or concrete. To neutralize the situation, touch the metal frame of your computer case. This allows you to safely discharge the static electricity before you touch anything else. If you must remove an expansion card or the motherboard, grip it on the side to avoid touching the tiny wires.

■ **Ready, Aim, Troubleshoot.** The rest is up to you. Take advantage of resources like this magazine to learn how to troubleshoot common problems. As your knowledge grows and you get your computer out of a few technical predicaments, you will achieve the confidence to call yourself a true troubleshooter. LS

*by Jeff Dodd*

# Get It Back

## Make Data Backups Quick & Easy

Computers have become such commonplace devices in our lives that we take them for granted. We don't realize how much we have stored in those little boxes on our desks. Instead, we just keep entering and saving more data—a few bookmarks, some more contacts, another Word document, and, of course, more e-mail messages. This data storage process is wonderfully simple; you just enter information and save it in a file. Then, when you want to access the data the next time, you just find the file and open it.

Well, this is all good until that one fateful day when a virus wipes out your hard drive, your computer room floods, or your notebook is stolen while you are at the airport. Now what do you do? All that time and effort was for nothing.

If this scenario frightens you, it should, especially if you don't back up your electronic data. Having a recent backup determines if one of these scenarios is a minor hassle or a major catastrophe.

If you ask computer users why they do not make backups, you get a range of answers, but they all boil down to backups taking too long and requiring the user to be available to swap tapes or discs. With modern hard drives exceeding 20GB in size and home backup media nowhere close to that capacity, it is easy to see why the lack of backup capacity is such an issue. Imagine trying to back up 20GB of data to 100MB Zip disks, 680MB CD-Rs (CD-recordable), or even 4GB tapes. Clearly, you need a better strategy.

Well, we are here to show you a few tricks you can use until removable media can hold more data. We will help you configure your personal computer and plan your backups so you completely protect your data from any disaster. In addition, we will show you how to set up the backups so they automatically run and take only a few minutes a day.

**What To Back Up.** The key to streamlining your backups is the simple realization that not everything on your hard drive needs the same level of protection. In fact, you don't ever need to back up most of the files. In general, the files on your hard drive fall into four categories: programs, configuration files, data, and static data. The main point of an effective backup strategy is how you back up the items in each of these categories.

**Programs.** This category includes Windows, Office, and any other applications, including shareware and freeware. If you have a legal copy of a proprietary application (privately created, owned, and copyrighted software such as Microsoft's Windows 98), you have the CD-ROM on which you purchased the software. (If the software came with your personal computer, then you should have received the CD-ROMs with your computer.) Once installed, software files do not change unless you install a patch or update. If software is lost or damaged, you can restore it from the distribution disc or diskette (and then download and install any updates or patches.)

For this reason, you do not need to back up commercial (bought) software. In fact, trying to restore commercial software from a backup may be more difficult, time consuming, and error prone than doing a fresh install from the distribution disc. Many backup programs will require you to have Windows running and their software installed before performing a restore so you may not be able to restore the Windows operating system from a backup anyway.

The only exception to the program rule has to do with freeware and shareware: You should always back up these types of applications. Because you may not have a diskette containing the software, you may want to copy the installation file onto a CD or diskette. This will save you from having to find and download the file again if you need to restore it to your system.

**Backup NOW! can write your backups to multiple CDs, and it can compress your data.**

**Configuration files.** Configuration files are the files that programs create to store their settings, or other files you create to customize your personal computer. If you have changed the settings on the Windows Start menu, Windows stores that information somewhere, either in a configuration file or the Registry (a database that

contains information about user preferences and system configuration). The same is true for changes you have made to Word, Excel, Netscape, or any other software you use. Being able to restore this information is nice but not essential.

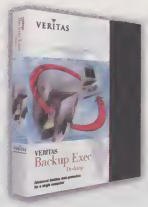
**Data.** This is the reason you have a computer. This is your financial records, letters, resume, e-mail messages, presentations, databases, and other files you have created and modified. Data represents your work at the computer. You want frequent backups of your data so nothing gets lost. Daily backups are best, especially if you frequently use your computer. For less frequent users, weekly backups may be acceptable.

**Static data.** This category contains the sound and video files you download or create. They differ from regular data because once you create or download them, you probably won't modify them. For example, once you rip or download an audio file, you are just going to play the song. That is, the data file itself will remain unchanged. With downloaded video, you usually watch it unmodified. You may modify video you create initially, but after the modification, you usually just watch it. In other words, you only need to back up static data once, when you acquire or create it. Even then, you only need to back up the new or changed files, not all of them.

**The approach.** So, our basic approach to backups is to:

- Never back up programs and configuration files or to make a backup only when you install a new program.
- Make a backup of static data only when that data is changed and, even then, only the data that changes.
- Make frequent backups of data files.

The problem with this approach is these four types of files are mixed up together on your hard drive. Specifying a data backup that gets all your data files is a complex task.




**Make the backup process extremely easy; schedule Backup Exec to automatically back up your system at night.**

**Hard Drive Structure.** There is one easy way to make specifying what you want to back up easier: partition. A **partition** is a reserved portion of the hard drive or memory that functions as a separate unit. When you partition your hard drive, you divide it up into smaller units. A partition acts as a separate space, but physically it is still part of the whole disk. This is a way to make the hard drive more efficient, and it makes it easier for you to perform your backups.

Imagine how easy it would be to back up all your data files if they were on a separate drive from your programs and configuration files. You could just tell your backup program to back up everything on the one drive. Well, you *can* do this. You could configure your system so all your programs and configuration files are on the C: drive with Windows. All your data files would be on the D: drive.

To do this, you don't need to have three physical hard drives; you just need to partition your hard drive. After partitioning, your system will treat the single hard drive as if it were two or more hard drives.

Unfortunately, to partition a hard drive using Windows FDISK application, you must erase the hard drive. However, programs such as PowerQuest's PartitionMagic can easily partition your hard drive with no loss of data. *(NOTE: For more information on PartitionMagic, see the "It's Magic" sidebar.)* However, you should always back up your critical data before you make any major change to your system.

Although you can partition your single hard drive into three logical drives with PartitionMagic (or even FDISK, if you must), you should strongly consider leaving your main drive for just programs and purchasing a second hard drive to be partitioned for both data and static data if you are a serious computer user. Hard drives are inexpensive and easy to install. Having all your data and static data on a separate physical hard drive makes it a snap to move that drive to a new computer if your present computer fails or when you upgrade to a new computer. It also lets you pull the data out of the computer before you have it serviced by a professional. This both preserves your data and provides additional security.

Readers with newer computers should especially consider adding a new hard drive. Most vendors have stopped shipping a Windows CD-ROM with new computers. Instead, you get a CD that essentially erases the entire hard drive and resets it to the factory settings. If your data is on that hard drive, PowerQuest's PartitionMagic is an essential tool. □

## It's Magic

Using the tools native to the DOS and Windows operating systems, partitioning your hard drive is a long and tedious process that requires you to destroy the entire contents of your hard drive and start over with a blank drive. Most users avoid the advantages that partitioning brings because the process of creating those partitions is so difficult.

PowerQuest's PartitionMagic software ($69.95; 800/379-2566, 801/437-8900; http://www.powerquest.com) overcomes all the problems with creating and managing partitions. To create a new partition or resize an existing one,using this application, you simply run the program and tell it what size to make each of the partitions. It then goes off and makes the adjustments without any loss of data.

If you are not sure if you need 100MB or 200MB for data, just take your best guess and do not worry about it. If you guess wrong, you can easily make an adjustment later without any loss of data. If you are going to keep an orderly arrangement of files on

**The PartitionMagic application is easier to use than Windows' FDISK program for partitioning your hard drive.**

***Having multiple backups protects you against the chance that your backup media might be damaged, and you can't restore data from it.***

drive, it too is erased. With the data on a second physical drive, it is untouched when the main drive is reset.

■ **Backup Types.** One you have your partitions set up, if you want them, you need to decide what type of backups you want to perform: full or incremental. A **full backup** copies every file you specify to the backup media; an **incremental backup** looks at all the files you specify but only backs up those that have changed since the last backup. A **full backup** takes longer and requires more space but makes restoring data easier. When you are in a hurry or having enough media space is an issue, an incremental backup's ability to grab just recently changed files means the backup quickly skips over files that have not changed since the last backup.

Backups are also categorized by where you store them. If you keep the backup media in the same location as the computer, it is called an **on-site backup**. When you store the backup somewhere else, it is an **off-site backup**. Having the media on-site makes it easy to recover an accidentally erased file or to recover from a virus, but this does not protect it from theft or disaster because the backup media would also be stolen or damaged. Most people who feel strongly about backups choose to keep some media on-site for local emergencies and some media off-site to protect against disasters.

Rather than having one set of media, many users choose to have several sets of backup media. They make a backup to the first, then the second, and so on. Once they reach the last set of media, they start over with the first one. This is a **rolling backup**. Having multiple backups protects you against the chance that your backup media might be damaged, and you can't restore data from it. It also lets you go back to an earlier version of a data file if it is required.

■ **Backup Media.** Once you know what type of backup you want to perform, you need to decide which type of media you want to use. The most common types are removable media such as Zip disks, CD-Rs and CD-RWs, and tapes. Another newer option is to store your backups online.

**Zip disks**. An Iomega Zip disk (800-69-7883; 888-446-6342; http://www.iomega.com), or similar removable media, such as an Iomega Jaz disk, is usually your fastest alternative for a backup. To back up to a Zip disk, you'll need to have a Zip drive (external and internal drives cost between $100 and $200) and use a compression program, if you want to save as much data as possible to one disk. You can use a program such as WinZip ($29; http://www.winzip.com) or PKZIP ($39.95 CD, $34 electronic; 414/354-8699; http://www.pkware.com) to compress the data. Although WinZip or any other zip program can make this backup, the best one to use is the command line version of PKZIP because you can control it using a batch file.

**If you want to save your data backup jobs to something other than a bunch of diskettes, try another form of removable media, such as Iomega Jaz disks, which hold more data.**

The main drawback is the limited capacity of these disks. For this reason, a Zip disk is viable only for data backups. However, most users will find that all their data will compress onto a single Zip disk because data is easy to compress. A secondary drawback is cost. A 100MB Zip disk holds one-seventh the amount of data that a CD-R can hold and at 10 times the cost. (A 100MB disk costs about $11.) It is even more expensive relative to tape. A 250MB disk costs $19.95.

**CDs.** A CD-R holds 680MB of data uncompressed, so it will hold much more than a Zip disk. Blank CDs cost about 50 cents so you can easily afford to make daily backups. In addition, because any computer with a CD drive can read these files, CDs are the most universal form of a backup. Stray magnetic signals can't damage CDs the way they can tapes, and they last much longer than tapes. The main drawbacks are you can't use the computer for other tasks while authoring any CD, and writing to the CD is slow.

If you don't need to compress your files during a backup, you can create the backup using your standard CD-authoring program. You also may run into another problem. Even though your present software may be adequate for simple backup needs, it is not specifically for creating backups. Your CD software might not work for your backup if you are saving large data files or programs. The reason is that it lacks two important features: compression and the ability to write larger backups across multiple CDs. Writing to multiple CDs or tapes is called **spanning**.

NewTech Infosystems' Backup NOW! ($79.99; 714/259-9700; http://www.ntius.com) combines the best of a tape backup program with advantages of writing to a CD; it can compress your data and can write out backups that span multiple CDs.

**Tapes.** Once your backup needs exceed the capacity of a CD, your only real choice is tape. Capacities and speed vary greatly with tapes. If you have an internal tape drive that holds 8GB of compressed data, you can make a backup of your entire system (if it is about 5.5GB in size) in less than two hours on one tape. External parallel port tape drives may hold only 1GB or 2GB, and they take much longer to perform a backup. If the amount of data you need to back up exceeds the capacity of your tape, the backup stops until you swap the full tape for an empty tape.

Most tape drives come with some type of limited backup software. For more features, you can purchase a commercial program. Often, these programs will also work with Zip disks and CD-R/RWs. One good commercial backup program is Veritas Software's Backup Excel Desktop 4.5 ($79; 888/732-2021;

http://www.veritas.com). You can even use this program to schedule backups to run at night unattended (as long as the backup does not exceed the capacity of your tape). In addition to tapes, Backup Exec supports CDs, Zip drives, and most other removable media.

**Online.** A fourth approach to backup media is to back up across the Internet to one of the online storage services that are available. Because most of these Web sites offer only 10MB to 20MB for free, most users will be able to use these Web sites only to back up their most critical files. Due to the amount of data you will be sending across the Internet, for this to be a viable method, you must have a DSL (Digital Subscriber Line) or cable connection. A few of your free options include: Driveway (25MB free; http://www.driveway.com), File Monkey, (10MB free; http://www.filemonkey.com), i-drive.com (50MB free; http://www.idrive.com), and My Docs Online (20MB free; http://www.mydocsonline.com).

**A Backup Bonanza.** As the amount of data that hard drives can hold has grown, so has the amount of data that users store. This makes backups more critical and difficult than ever. Fortunately, Zip, CD-R, and tape drives and media give users inexpensive backup options. When combined with an intelligent plan for segregating files by type, backups remain the best approach to data protection. LS

*by Ronny Richardson*

## A Simple Solution

If you want a cheap way to protect your data, look at the Microsoft Backup application. This program comes in Windows 95 and 98 (Win9x), and it is included on the Windows Me installation CD-ROM. This program is adequate for making simple backups to common backup devices.

To access Backup in Win9x, click the Start menu, Programs, Accessories, System Tools, and then Backup. In WinMe, you first need to install the application from the installation CD-ROM. After you insert the CD, click the Browse This CD link. Then, double-click the ADD-ONS folder and then the MSBACKUP folder. From there, double-click the Msbexp.exe file. Once you install Backup and restart your computer (you'll be prompted by the computer to do so), you're ready to start. To begin, click the Start button, Accessories, System Tools, and then Backup.

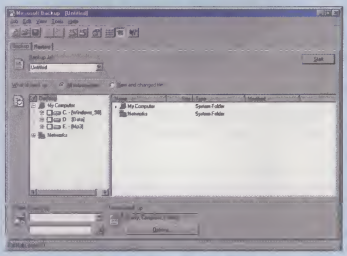
### Windows 98 & Me

When Microsoft Backup opens in Win98 or WinMe, you will see two windows. The active one is the Backup Wizard. Select the Create A New Backup Job radio button and click the OK button.

On the next screen of the Backup Wizard, choose what you want to back up. Starting small, choose the Back Up Selected Files, Folders And Drives radio button from the Backup wizard, and click the Next button. Now you simply check the boxes next to the files you want to back up. If you click the box beside a folder, it will back up the entire contents of that folder. To view a folder within a folder, click the small plus sign to expand the folder. Then, to select only certain files, highlight a folder and then check the items you want to back up on the left side of the screen. Once you finish, click the Next button.

On the What To Back Up screen, choose whether to back up the entire contents of the folders and files you selected or just the elements that have changed (since your last backup) or that are new. Click Next. At the next screen, decide where you want to store these files. Use the drop-down menus to select where you want the files stored.

On the How To Back Up screen, decide if you want to run a double-check that Backup copied everything correctly, and if you want to compress the files to save space. Click the Next button to continue. Make a final check that everything is set as you want it and name your backup job. Then, click Start to begin the backup. (*NOTE: Backup may ask you for a Media Name. It suggests you call it the job name followed by a number, but you can name it whatever you want.*)



**In Windows 98 and Me, you can easily back up your data files using the Microsoft Backup application that comes with either operating system.**

### Windows 95

When Backup opens in Win95, you will see the Welcome To Microsoft Backup screen. Click OK to move to the next screen, which will tell you Backup has created a file set you must use if you are doing a full backup. Because we are going to do only a partial backup, ignore this box and click OK.

From the Settings menu, click Options. Click the Backup tab and choose the Full or incremental radio button. Click OK. Back in the main Backup window, select the files you want to back up. (This works the same in Win95 as in does in Win98, so see the above instructions.)

After you make your selections, click the Next Step button. Select a destination for the backup and then click Start Backup.

### Keep Going

It would be nice if you could automate Backup, but as it is, you have to tell it to back up every time you want the job done. Still, it's as simple as choosing Microsoft Backup from the System Tools in the Start menu and telling it to run an existing job. You can create more jobs by repeating the steps explained above. To modify a job, select it, and you can alter your selections. □

WISH GRANTED.

DID I MISS MY TURN? WAS THAT A PIECE OF METAL I JUST DROVE OVER? I CAN'T BELIEVE SOMEONE STOLE MY CAR. WHEN YOU FIND YOURSELF IN PERIL, JUST PRESS THE ONSTAR BUTTON IN YOUR CAR. STRANDED? WE'LL LOCATE YOU BY SATELLITE AND SEND FOR A TOW TRUCK. CAR STOLEN? WE'LL TRACK IT AND NOTIFY THE POLICE. LOST? WE'LL GUIDE YOU. IT'S LIKE HAVING YOUR OWN PERSONAL SUPERHERO. TO FIND OUT HOW TO GET ONSTAR ON YOUR NEXT VEHICLE, SEE YOUR CHEVROLET, PONTIAC, GMC, OLDSMOBILE, BUICK, CADILLAC OR SAAB DEALER, CALL 1-888-ONSTAR-7, OR VISIT WWW.ONSTAR.COM.

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# Give Your System The Boot

## Creating & Using A Startup Diskette

One tool you'll need when you troubleshoot any PC problem is a startup diskette. An emergency startup diskette has special system files on it that let you start your computer when your main system won't start properly. It is important that every computer user has one of these on hand at all times.

■ **When You Boot.** To understand why you need a boot diskette, it is important to be familiar with the boot process. When your computer starts up, it sends an electrical signal to the CPU. From there, the CPU heads to the **BIOS** (**Basic Input/Output System**) to find startup instructions. The BIOS enables and configures your hardware. It also performs a number of important tasks, including the **POST** (power on self test), which makes sure all the computer's components are working correctly.

The BIOS alone can't get your system going; your computer has to access system information that is stored in a few system files. These files are the first things that load after the BIOS, and they contain basic commands about how to access the rest of your system. (See below for more information on these system files.)

Normally, the computer gathers this information from your hard drive. If you have more than one hard drive, one drive or **partition** (a reserved portion of memory that functions as a separate unit) will be the primary drive, and it will contain the system files needed for booting. However, if your hard drive becomes corrupt, or if your system has some irreconcilable conflict, you may not be able to load the system files you need to boot up your system.

If that happens, you're facing a real problem. You can't boot the system without those files, and you can't fix the problem until you can boot your system. That's why you will always want to have a bootable diskette, also know as a startup diskette, on hand. A startup diskette is usually a diskette on which you place copies of the files needed to start the system.

*(NOTE: Even though most people use diskettes for their startup diskette, and that's what we'll focus on in this article, you should be aware that you also can use other removable media, such as a Zip disk, for your boot disk.)*

■ **System Files.** Any boot diskette always has at least three files that must be on it. First, there are two hidden system files: Io.sys and Msdos.sys. You will see these files only if you have your folders set up to show hidden or system files. These two files form the **kernel** (the main part of an operating system; it handles the most basic but most important tasks, such as managing the computer's resources, starting programs, and keeping time) of the MS-DOS OS (operating system), and they contain information telling your system how and what to boot and in what order to perform the steps. The other file is Command.com, and it is a command interpreter.

Your emergency boot diskette will also contain files such as Config.sys, Autoexec.bat, Himem.sys, Fdisk.exe, and others. On a Windows 98 or Me startup diskette, there also will be files for loading drivers for your CD-ROM drive.

■ **The Creation Process.** Making an emergency startup diskette is a simple task. You will want to always have at least one such diskette handy, and maybe two just to be certain you can use your personal computer if the first diskette does not function for some reason.

To create a startup diskette in Windows 95, Win98, or WinMe, you will want to use the Add/Remove Programs control panel. To access it, click the Start button, Settings, and then Control Panel. Double-click the Add/Remove Programs icon. In the Add/Remove Programs Properties dialog box, you'll see three tabs: Install/Uninstall, Windows Setup, and Startup Disk. Select the Startup Disk tab.

**In Windows Me and some other versions of Windows, you can make a startup diskette that will not only reboot your system in an emergency but also prepare it so you can reinstall Windows if you need to.**

Click the Create Disk button. Next, you may need to insert your Windows installation CD-ROM or diskette. Click OK after you insert it. You'll then see a gauge that monitors the progress of file copying process. Next, you will see a warning box with instructions to insert a diskette in your drive if you haven't done so. This message will also warn you that Windows is about to delete all the

files on the diskette. Put a diskette in the diskette drive and click the OK button to continue creating the startup diskette.

Once the files finish copying to your diskette, click the OK button at the bottom of the Add/Remove Programs Properties box. That's all there is to it.

**Win95.** One major limitation of the Win95 disk is you must copy the appropriate CD-ROM drivers and add a Config.sys and Autoexec.bat file with driver statements to the diskette. CD-ROM support lets you reinstall Windows from CD-ROM if necessary. (The Win98 and WinMe disk already contain a CD-ROM driver.)

To add the appropriate drivers to the diskette, follow a procedure similar to this. In this example, we'll use the name Cdrom.sys as the name for the CD-ROM driver in Config.sys; the name of your actual driver will vary. First, copy the Cdrom.sys file from your CD-ROM drive's setup diskette to your emergency boot diskette. Then, copy the Mscdex.exe and Himem.sys files from C:\WINDOWS to the emergency startup diskette. Next, use Notepad to open your emergency diskette's Config.sys file. Enter the following in the Notepad document:

```
dos=high
device=himem.sys
device=cdrom.sys /d:mycdrom
```

Then, use Notepad to edit the Autoexec.bat on your emergency diskette. Add the following contents to it:

```
mscdex /d:mycdrom /M: 10 /l:k
```

Replace "k" in the /l: statement above with the drive letter of your CD-ROM drive.

■ **Using Your Diskette.** To use your Startup diskette, you just place it in your diskette drive while the computer is off. Then turn your computer on and the system files will load from the diskette in your diskette drive. You can also put the diskette in while your computer is on and reboot with the CTRL-ALT-DELETE key combination.

The order in which your computer looks for system files to load is set up not on the startup diskette, but on your hardware system itself. The default boot order is for your computer to first check your diskette drive and then your primary hard drive partition. If your computer is not working in this way (for example, it may be accessing your hard drive first), you will have to enter your personal computer's setup menus, which is where the boot order is found. To enter setup, carefully look at the first or second screen your computer shows you when you turn it on. One of the screens will tell you to press a certain key, such as F2 or F1, so you can change your setup.

Press the key and enter the setup menu. Be very careful with what you do here because you can make your computer unworkable if you set the wrong commands. (Fortunately, setup generally has a Restore Defaults command you can use if something goes wrong.) You'll have to find the place where the boot order is set; this may be on the main screen or on a submenu. Every computer BIOS has a slightly different setup format so you'll have to poke around a bit to find it.

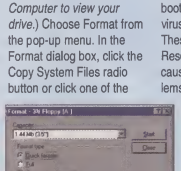
In some cases, you will see a list that includes the following options: First Boot Device, Second Boot Device, and Third Boot Device. In other cases, it will be a revolving menu, with options such as "A: then C," "SCSI then C:," or "C: then A:." Make sure the boot order is set as you want it to be, then save the changes, and exit the program. Your personal computer will resume startup, and if all is set correctly, will now boot from your bootable diskette. LS

*by Jennifer Powell*

## The Basic Boot

An emergency startup diskette is not the only kind of boot diskette you can make. You also can create bootable diskettes that will start your system if you have a problem but that won't let you reinstall the Windows OS(operating system.)

The simplest bootable diskette you can make uses an old MS-DOS command. At the MS-DOS prompt, type **format a: /s**. This formats the diskette in your a: drive (which is probably your diskette drive) and copies the system files to the disk. The files copied will be the kernel files Io.sys and Msdos.sys, Command.com, and perhaps Drvspace.bin, which handles compressed data. Using this simple boot diskette will load MS-DOS into your computer's memory but because it doesn't have the CD-ROM device drivers, you will only be able to access your hard drive(s). You also can make this type of boot diskette in Windows 95 and 98. Open Windows Explorer by right-clicking the Start button and selecting Explore. Insert a diskette into your diskette drive and then right-click the icon for that drive on the left side of the window. (*NOTE: You may need to click the plus sign to the left of My Computer to view your drive.*) Choose Format from the pop-up menu. In the Format dialog box, click the Copy System Files radio button or click one of the formatting radio buttons and then click the Copy System Files box at the bottom of the screen. (*NOTE: When formatting a diskette, it will erase all the existing files on the diskette.*) Once you have chosen the correct options, click the Start button to create the boot diskette.




**When creating a boot diskette in Windows 95 or 98, you can choose to copy the system files on the diskette or to format the diskette and then copy the system files to it.**

You may also be able to create another type of bootable diskette using your virus-checking software. These are usually called Rescue Disks. If a virus causes your system problems, you would use these diskettes to clean your system. You must create these disks using the instructions that come with your virus-checking software, and you can often put the files on a diskette or another form of removable media, such as a Zip disk. These diskettes, in addition to the normal startup files, will have a backup of your system's Master Boot Record (which contains information about the files on your hard drives and where the files are located), and a program that can detect potential viruses and clear them from your system. □

# Eliminate The Obvious

## Don't Overlook The Easy Stuff When Trying To Fix Problems

Murphy's Law and computers go together just about as well as pizza and beer. Just when you settle back and marvel at how well your system is working, something is bound to go wrong. It has happened to all of us at one time or another. You decide to upgrade your aging video card, install the newest version of your favorite program, or, worse yet, the power goes out, and you don't have a battery backup. You turn on your PC or reboot after the upgrade or power outage, and that's the last time you and your PC live in Happy Valley.

Why things go from good to bad in half a keystroke is still under investigation, but you can rest assured that you are not the only person who has PC problems. We have all been victims of the "Oh No!" syndrome. You knew as soon as you pressed the ENTER key that you shouldn't have done that, but it's too late. Don't press the panic button yet or do anything too crazy. Take a couple of deep breaths, retrace your steps, and see if you can't clean up your mess.

Troubleshooting a computer takes Sherlock Holmes-like skill mixed with a good helping of patience. Most of the time, a little logic and the process of elimination will help you track down the problem with your personal computer. Is it a hardware failure or software conflict? Did your power supply fail or is the power cord unplugged? Following a specific set of steps will usually help you find the source of your trouble.

Generally, computer problems fall into two categories: hardware and software. We also can add a third category: user error. The user will adversely affect the function and performance of the PC more often then any hardware- or software-related failure.

The one thing to keep in mind as you work through your problem is the safety of your data. Depending on the severity of the problem, you may want to back up all your data to a diskette or a Zip disk before attempting to repair the error, just to be sure. Unless your PC problem is hard drive related, there probably is not a big chance of trashing your data. But, it definitely pays to be safe. When in doubt, back it up.

**Hardware Troubleshooting.** One of the scariest things to go through as a computer user is what to do when you turn on the power to your PC and nothing happens or an error message pops up. Sometimes these are extremely easy to solve, and sometimes they are not.

One of the most common errors witnessed on a PC when you first turn it on is the Non-System Disk Or Disk Error, Replace And Strike Any Key When Ready message. This gives many new computer users a case of the shakes, but all it really means is you didn't remove a diskette from your diskette drive before you turned on the power to your PC. Simply eject the diskette and press a key to continue the boot process. Even though this doesn't hurt the system, this is a good way for a boot sector virus to spread from the diskette to your PC's hard drive so be careful not to leave a diskette in your diskette drive.

If you press the power button on your PC and nothing happens, such as no lights lighting up or fans making noises, don't panic. Double-check that you have the power cable to your PC plugged in tightly to the power supply and your surge protector. If your surge protector has a circuit breaker or other power-fault indicator, reset it and make sure the surge protector is getting power by plugging in another device or appliance.

If everything checks out—from the wall outlet to the back of your computer—try this: Unplug the power cable from the back of your PC, count to 10, and reconnect the cable. Now press the on button on your PC and see if everything starts working. Sometimes during power outages, a spike or surge will make its way to your PC's power supply and trip its internal protection. As long as the power cable is plugged in, the power supply can't reset itself, and it will never come up. Unplugging the power cable lets the power supply drain down any residual charge and start fresh.

**Hard drives.** Another error that is more common on older PCs is when the BIOS (Basic Input/Output System) in the PC forgets what kind of hard drive it has. Most BIOSes produced in the past few years will automatically detect the type and size of the drive installed in the computer on boot up, but you have to tell some older ones.

As your computer runs through its POST (power on self test), look for a message that says something to the effect of Press DEL To Enter Setup. Press the indicated key, which also could be something such as F2 or F1, and

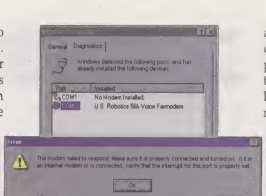
use your keyboard arrow keys to navigate to the area that deals with the hard drives. Some BIOSes will have a selection for Automatically Detect Hard Drives; others will prompt you to enter the information manually. (See the "BIOS" article in this issue for more information.)

If you have to enter the information manually, be careful to enter the number of cylinders, heads, and sectors per track as indicated for your specific hard drive. This information is usually printed on the hard drive (you have to open up the case to get this information) or available in your PCs documentation. This process seems scary, but it isn't too bad. Just read everything carefully, and you should be fine.

**Keyboards and mice.** Ever wondered why some engineer created the message Keyboard Not Detected, Press Any Key To Continue? If nothing else, it quickly alerts you to a problem with your keyboard connection. More than likely, it has simply come loose from the back of the PC. Just reconnect it, and you should be ready to go.

Possible mice problems are not so readily apparent. If there is no keyboard present, the system will not boot up. But if your mouse is loose or missing, the system will still boot up, and Windows will give you an error message. Simply shut down your PC using the keyboard and check your mouse cable. (Press CTRL-ESC to access the Start menu and then use the arrow keys to shut down the PC.) Make sure it is in tight and no pins are bent.

**Printers—round 1.** Printers are one of the most frustrating devices ever conjured up by engineers. Just when you think you have your page all laid out and set to go, you click Print and either nothing happens or the page doesn't print anything you wanted it to print. Before you haul the printer out to the dumpster, try some of these things first.


Diagnostics
Windows detected the following ports and has already installed the following devices:
Port
Installed
COM1
No Modem Installed.
U.S. Robotics 56k Voice Faxmodem
The modem failed to respond. Make sure it is properly connected and turned on. If it is an internal modem or is connected, verify that the interrupt for the port is properly set.
OK
OK
Cancel

**An easy way to check the status of your modem is to have Windows try to communicate with it directly.**

First things first: Do you have the printer plugged into the wall and to your PC? Always check your cabling before chasing other phantom issues. If it is a new printer and you are using your old parallel cable, your new printer may require an IEEE 1284 bi-directional printer cable. Not all printer cables have all 25 pins connected end to end.

How many times have you sent a print job, waited, and waited some more only to see a blinking error link on the front of the printer? How long has it taken you to realize the only thing wrong with the printer is it is out of paper? Always eliminate the obvious problems with the printer before you jump into any technical problem solvers. Just because it does not print that does not mean it is a printer driver problem. Check for paper in the tray before reinstalling the printer driver. Do not take the chance of creating a whole new set of problems by reinstalling the device driver.

If your printer simply refuses to print in black or any specific color, check the ink level in the cartridge before calling in a repair technician. Many times a new cartridge clears up print problems on the spot. If the output is fuzzy, do a little housekeeping on the printer by carefully cleaning the print heads or blowing out loose toner. A clean printer is a happy printer. (See your printer's documentation for specific instruction on how to clean your printer.)

**Modems.** Your modem is your lifeline to the rest of the digital world. So, when something goes wrong with it, it is important to fix the problem as quickly as possible. A modem can be a tricky item to troubleshoot, but just like the printer, take it one step at a time and eliminate the easy stuff first.

If your modem tries to dial but can't connect to your ISP (Internet service provider), check the phone line. Unplug the line from the modem and plug it into a standard telephone. Do you get a dial tone? Can you make a call to someone else? If you can, then there is something up with your modem. If not, start working your way up the cable, through any surge suppressors, to the wall jack until the line starts working. Swap the phone line out with a known good one. If you still don't get a dial tone, it is time to call your local telephone provider.

## Curb Dummy Mistakes

Troubleshooting hardware and software errors is never a fun thing to do. You can save yourself a lot of time by checking for the obvious and eliminating potential problem areas. Here is a list of the obvious questions to answer before you start ripping apart your PC or tinkering with the Registry to fix a problem. These questions will help you prevent dummy mistakes.

- Is the computer plugged into a working surge protector?
- Is the monitor turned on and connected to the computer?
- Is there a diskette in the diskette drive?
- Are your keyboard and mouse plugged in securely and in the right ports?
- Does your printer have toner/ink?
- Is there a dial tone on your modem line?
- Does a telephone work on the modem line?
- What have you added or changed recently?
- Can you uninstall the program to clear up the error?
- Can you remove the hardware and clear up the error?
- When was the last time you ran Scandisk or defragmented your PC?
- Did you reboot your PC to see if that solved the problem?

If none of these questions helps you solve your problem, one of the most important things you can do is keep a log—either physical or mental—of what happened to cause the problem. Knowing where you came from can be vitally important in getting the system back to where it needs to be. In addition, write down any error messages you get. Most vendors' Web sites will let you search their knowledge bases for the error you received, and they will recommend fixes or courses of action.

If the line checks out OK, but your modem just won't connect, check your Dial-Up Networking settings. Click the Start button, select Setting, click Control Panel, and double-click the Networking (or Network) icon. On the Configuration tab, make sure you see the TCP/IP->Dial-Up Adapter and the Client For Microsoft Networks items. If you don't have either of these, you can install them by clicking the Add button.

If the modem does not respond at all, check it out by going to the Control Panel window. Double-click Modems this time. Choose the Diagnostics tab and click More Info. This tells Windows to try to talk to the modem and return some status information. If there is no response, then something has failed in the modem.

***You will end up troubleshooting software issues more than anything else during your tour of duty with your PC.***

More often than not, this tab will also tell you what hardware is conflicting with it. The fun part is finding free resources to move other devices to in order to get everything to load correctly. You can do it as long as you have a little patience.

■ **Software Troubleshooting.** You will end up troubleshooting software issues more than anything else during your tour of duty with your PC. No matter how careful you research a new or upgraded piece of software for your system, if it can go wrong, it will. Tracking down just what happened is the real trick to putting the pieces back together.

When you are troubleshooting software issues, there is no rule to go by. Error messages and cryptic strings of numbers will be your lifeline to finding the cause of the problem.

**When Windows goes bad.** The worst problems are always operating system problems. When things go wrong in Windows, you can expect to get a visit from the Blue Screen of Death. Before you punch the power button in frustration, though, take a moment to write down the first couple of lines of the error messages you see. Normally, the error will read something such as Explorer Caused An Invalid Page Fault In Module User32.dll At 0167:0ffda01214. Unbelievably, this information can help you narrow down the list of possible causes. Check out the offending application's Web site and search its knowledge base using the error message to see if any articles can help you solve your particular problem.

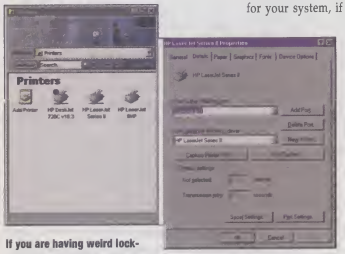
If you experience other system hangs, a way to find the offending program is to press the CTRL-ALT-DELETE key combination to bring up open programs list in Windows. The program that is no longer playing well with the other programs will have the Program Not Responding message to its right. Click the task to highlight it and then click the End Task button to close it and (hopefully) regain control of your system.

**Printers—round 2.** Those pesky printers can even play a part in system lockups, too. Printer drivers not only affect what ends up on paper but also what you see on your monitor's screen. This means that the printer driver reaches its tendrils into your font file, which in turn can affect your video driver.

To troubleshoot possible printer/video driver conflicts, change to a more generic version of the printer driver. For example, if you have a laser printer, more than likely it will emulate a Hewlett-Packard LaserJet II. If it does, try switching to this printer diver, and if this clears up the problem, check the Web for a newer version of the driver.

■ **Getting More Specific.** At some point, you will have to troubleshoot something on your personal computer. Whether it is a failed piece of hardware or printer driver gone awry, patience and taking things one at a time will help you eliminate possible causes and narrow your search. Error messages are frustrating, but they can also be invaluable for pointing you in the right direction. With a little patience and luck, you can clear up any problem you will come across on your PC. If you still need more help, check out the other articles in this issue. LS

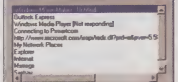
*by Keith Schultz*




**If you are having weird lockup problems, especially when you are trying to print something, try stepping back to a generic printer driver to see if the problem goes away.**

Resource conflicts. Many times, bad drivers cause hardware errors. Hardware resource conflicts also cause hardware problems. If everything was working correctly before you installed your new sound card (or any other piece of hardware, for that matter), more than likely it is trying to use resources already in use by existing hardware.

One way to resolve the conflict is to find out what resources the new hardware wants to use and compare them to your existing hardware. In Windows 95 and 98, you can check this by opening the Control Panel, double-clicking System, and selecting the Device Manager tab. Locate the hardware with the yellow exclamation point next to it and right-click it. Click Properties and then the Resources tab to see what hardware resources it is trying to use.




**If you experience a system hang, you can easily end the system slowdown by finding out what program is causing the problem and shutting that program down.**

# Data Rescue Missions

## How To Salvage Files After A System Crash Or Hard Drive Meltdown

Conventional wisdom states the best insurance against losing data is making sure it is backed up regularly, and this is definitely true. But system crashes, power outages, and other problems can cause the loss of valuable data at very inopportune times. And what happens when you back up *over* your data *with your car*?

It may sound ridiculous, but this is just one example of a real-life disaster that cost someone a notebook computer, and *almost* caused him to lose the data on its hard drive. Fortunately, a data recovery service was able to access and retrieve the data for him. Other stories featured on the DriveSavers' Web site (http://www.drivesavers.com) section labeled "Museum of Bizarre Disk-asters" include tales of computers destroyed by fire, one sinking to the bottom of the Amazon River, and another one run over by a shuttle bus—all of which DriveSavers was able to take on as challenges and successfully recover data from their hard drives.

While backing up data is crucial, disastrous events can still thwart the most careful of users. One might think that this only applies to users of notebook computers, which are the most susceptible to dropping, smashing, and other travel-related mishaps, but desktop computers also suffer from their fair share of hardships involving fire, earthquakes, hurricanes, and hard drive failure. Thankfully, all is not lost. Even if your computer isn't connected to a network where your data is routinely stored on network servers that receive daily backups, there are steps you can take to recover your data, and in numerous cases, it *can* be recovered.

**Software-Related Recovery.** Let's talk about the easiest form of data loss to recover from and how to do it. Let's assume that you're working on a Microsoft Word document when a power outage causes everything to shut down—and guess what, you haven't saved your work for a while. What can you do?

First, in the event of an application that freezes (or otherwise seems to stop responding), you may have to press CTRL-ALT-DEL (jokingly known as the "three-fingered salute") to display a window where you may find your application listed as "not responding." Occasionally, waiting long enough will allow applications to recover normally so you can continue working. Oftentimes, however, you will need to select the disruptive application in the list, and click the End Task button to terminate the application. If this occurs, you should save any other files you are presently working on, and then shut down and restart Windows. This will ensure your system a fresh start, and hopefully, minimize potential data loss.

The first rule of thumb for data recovery (and, more specifically, data loss prevention) is this; Save and save often. Most Microsoft applications let you specify parameters for "auto saving," and how often you want the system to make backup copies. For example, in Word 2000, select Options from the Tools menu, choose the Save tab, and click the checkbox next to Always Create Backup Copy. When activated, this option makes sure a backup copy of your document (named "Backup of *<your document name>*") is saved to the same directory where the file is located.

From the same dialog box, you'll also notice a checkbox next to Save AutoRecover Info Every *X* Minutes (with the "*X*" designating the number of minutes you want it set for). The default setting is 10 minutes, but you can change it to whatever is appropriate. An autorecover file is a file that stores information about all the changes you've made to your document, saving this information at the specified time intervals. Should you forget to save a document or your system crashes suddenly, you can restart your computer and open the autorecover file to reclaim your changes. This assumes, of course, that your original file wasn't destroyed in the process.

In addition, you can specify where autorecover information is stored. Again, from the same dialog box, click the File Locations tab, select AutoRecover Files, and click the Modify button. We recommend storing the autorecover files on a separate hard drive or network drive if you have access to one. With these options enabled, you have a reasonable level of assurance of recovering your document or most of your unsaved changes the next time you start your computer. Remember to reopen Word after your system restarts, select Open from the File menu, and try to locate the autorecover document. If it is unavailable, or otherwise compromised,

browse to the location where your backup copies are kept and try opening those instead.

One final feature (again, specific to Word 2000) lets users attempt to recover data from damaged documents. In this case, if you don't have a backup, click Tools, Options, and then select the General tab. Click the checkbox next to Confirm Conversion At Open, and click OK. Next, click Open, and in the Files Of Type drop-down menu, click Recover Text From Any File. Now you can open the document as usual.

Most modern Windows programs will have similar features built in. Additionally, all programs use temporary files, usually stored in the WINDOWS\TEMP directory. If a PC suddenly loses power, the program that created the temporary file will not be able to clear out the file from the WINDOWS\TEMP folder. Believe it or not, it is possible to locate the last temporary file created by the application and open it. Even so, locating the file is a difficult task and it may not be in a recoverable state, but it's still worth a try.

Finally, if you have access to a scanner and OCR (optical character recognition) software, you can try scanning a hard copy of your document if all of your attempts to access it digitally are unsuccessful. This approach can be time-consuming. Scanning the document and correcting the formatting after it's scanned can be a lengthy process. For this, you will need a powerful OCR software program. Many scanning packages, particularly those bundled with scanners, can only do the most basic OCR functions, and some can only convert your document into a graphics format, which means you won't be able to edit or work on it in a word processing application.

**Accidents Do Happen.** If you accidentally delete a file that you didn't want to delete, keep in mind that the Recycle Bin was created just for this reason. By default, whenever you delete something, it first goes to the Recycle Bin. Should you inadvertently delete a file, open the Recycle Bin, right-click the file, and select Restore to restore the file to its previous location on your hard drive.

Note that it is possible to effectively "turn off" the Recycle Bin, but it's not something we recommend. After all, everyone makes mistakes. To make sure your Recycle Bin is "on," right-click it and select Properties. Make sure the checkbox for Do Not Move Files To The Recycle Bin does *not* have a check mark. While you're at it, you may want to increase or decrease the amount of hard drive space allocated to the Recycle Bin by adjusting the slider bar. The more drive space you allocate, the larger the Recycle Bin, but at the same time, this will reduce your available amount of hard drive space.

If all else fails, there are software programs, such as Norton's SystemWorks 2001 ($59.95; 877/255-7907, 408/253-9600; http://www.symantec.com/product), that can even undelete files removed from the Recycle Bin. This offers an additional layer of protection against system crashes or user errors. Utilities like these require more system overhead, which means they load programs that remain resident in your computer's memory. This may affect performance, although it's usually not noticeable on most newer computers.

**DriveSavers, a data recovery service and home of the Museum of Bizarre Disk-asters, was able to successfully retrieve data from the computers pictured above.**

**Recuperate From Hard Drive Failure.** So, what happens when your hard drive completely fails or is on the verge of failure? It is a fact that *all* hard drives inevitably fail. The life expectancy of a hard drive is expressed as the MTBF (mean time between failures) and is measured in hours, typically between 50,000 and 100,000 hours, or possibly more. This equates to about a two- to seven-year life span. The MTBF for a hard drive ultimately depends on how frequently it is used. Therefore, business users who spend several hours each day on their computers are far more likely to encounter hard drive failures than home users.

Hard drives are fragile devices. Inside, tiny motor-driven heads move across aluminum platters, reading and writing data. The heads are only a few microns (one micron is less than the width of a human hair) above the platters, and the platters rotate as much as 10,000 times per minute. A type of "crash" or "collision" occurs when a "head" physically hits a platter, which damages the platter and makes the data on part or all of the drive unreadable. This can be the result of a drive being bumped or dropped, or caused by a severe mechanical or electrical failure. Hard drive failure can also occur as the result of power spikes, excess static electricity, or natural causes (simple, inevitable mechanical failure due to age and amount of use).

It is possible for a hard drive to start to fail without being immediately noticeable, and this can make them difficult to diagnose right away because drive-related problems come in many forms and are easily confused with other computer problems. For this reason, if at all possible, we recommend contacting the technical support department of your computer manufacturer or hard drive manufacturer before attempting any diagnostics, troubleshooting, or removing the drive. Although they may not have the ability to recover data, they should be able to verify whether your drive is failing and might be able to ship you a replacement if your hard drive is under warranty.

Computer manufacturers (such as Dell or Gateway, for example) usually want the failed drive in return for the replacement, so make sure you have everything off your hard drive that you need before getting the replacement. Or at least arrange it in such a fashion that you have a week or more of lee time to recover your data, install the new drive, and return the old drive to the manufacturer. If you need to, talk to a data recovery service about getting your data off the drive before arranging for a drive replacement. Either way, make it clear that swapping or replacing the hard drive is only acceptable as long as you can attempt to retrieve data from the damaged drive first.

Hard drives on the verge of failing often make excessive grinding and clicking noises. When the drive head makes initial contact

with a platter and scratches it, it creates a small divot. This makes a small area of the platter unreadable, and any data stored there will be corrupt or otherwise inaccessible. Some head collisions are more severe than others are. Some may render the drive completely inoperable, while others may allow the drive to continue functioning. However, even if the drive does continue to function, you may not suspect that a head collision has occurred until trying to access a particular file. Even then, many of us may assume the file itself was corrupt and not that the drive is failing.

**The backup options for Microsoft Word 2000 are similar to those available in all Office products. Use these features to alleviate the likelihood of losing data during a program freeze or system crash.**

Unfortunately, the damaged area of the drive and the tiny particles left behind from the head collision can cause additional harm over time. The particles may jam drive heads or the actuator motors driving them, causing more damage. As more and more data becomes corrupt, the hard drive's space continues to be "eaten up." At this point, it's just a matter of a time before the operating system renders the system unusable.

If you or a technician notice the hard drive failure symptoms in time, you'll be able to back up vital data and replace the drive before the inevitable occurs. When you do this, you should try to back up data and shut off the machine as soon as possible, but do *not* save, install, or write to the hard drive. This can cause further data corruption. If possible, copy your data to a secondary hard drive or media for a Zip drive, Jaz drive, disc drive, or even a diskette drive, but do it quickly. Also, be sure to verify that any backed up files are actually good. For more information about performing data backups, see "Get It Back" in this issue. Again, consult the manufacturer's technical support department (if possible) before doing anything else.

Something else you should be aware of in the event of a hard drive failure is that utilities such as ScanDisk, Disk Defragmenter, as well as various Norton disk utilities included in Norton SystemWorks 2001 can be dangerous to run on failing drives. They may make changes to the file system in an attempt to "fix" a perceived problem, and this can render recovery more difficult, or even make it impossible. If you do run any diagnostic software, always make an "undo" diskette if the utility presents this option. That way, if the utility is unable to correct your drive problem, the "undo" diskette will allow you to undo the failed fix attempt.

It's also generally best *not* to employ DOS formatting or partitioning commands such as FDISK and FORMAT, or make *any* changes to partitions on failing drives with partition utilities. These actions can reduce the chance of successful data recovery. Finally, never open a failed or failing hard drive, and definitely do not tap, hit, shake, juggle, or otherwise do anything that might hinder your chances for a successful data recovery. It requires special tools and training to recover data from a failed drive. DriveSavers' Web site has some basic troubleshooting tips, which may also help identify the hard drive problem (provided you still have a way to access the Internet).

## Data Recovery Specialists

If you haven't already selected a data recovery service, there are many choices available. If you have Internet access, conducting a search for "data recovery" will yield numerous hits to start your research. Skimming through the phone book might also be worthwhile. Although data recovery is quite specialized and professionals may not be easy to find, using a qualified, local service could save you considerable time and cost. If time permits, we recommend calling several before deciding upon one. Make sure you ask whether they have a "no data, no charge" policy, meaning that if they can't recover any data, you don't get a bill.

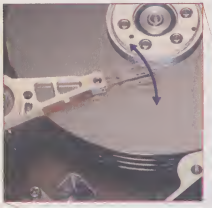
Many businesses have insurance policies that cover data recovery expenses. Look at your policy and see what coverage is available to you. Most of all, before trusting any service with your valuable data, check its references and research its reputation with organizations such as the Better Business Bureau (http://www.bbb.org). We've included information about a few of the most popular data recovery services below.

Ontrack Data International (800/872-2599, 952/937-5161; http://www.ontrack.com), may be one of the oldest and biggest data recovery services, having its roots in software development and expanding into a full-featured recovery service and software developer over the past 15 years. One of its products, SystemSuite 3.0, is specifically designed to protect against and correct disk-related problems, including viruses, drive failure, and other issues.

For mission-critical data, Ontrack even offers on-site service, and will fly a technician out to you if you aren't located near one of their seven worldwide locations. On-site service can't recover data where "clean rooms" might be needed for decontamination, so if you have a hard drive that was severely burned or water-logged, you'll need to send the drive to Ontrack.

DriveSavers (800/440-1904, 415/382-2000; http://www.drivesavers.com), in addition to its standard recovery services, employs a professional "Data Crisis Counselor" who provides counseling and data recovery information all in one package. The counselor, a professional psychologist, helps evaluate situations, provide information on available options, and alleviate the stress that is common in a data loss situation.

The Drive Service Company (888/272-8332, 714/549-3475; http://www.driveservice.com) offers free data recovery quotes, and if it can't retrieve your data, the only fee you'll pay for is return shipping. In addition, the Drive Service Company provides an informative list on its site of the "best and worst" drives, in terms of reliability and engineering. This may be worth consulting before purchasing a hard drive.



**There are moving parts inside the hard drive that, over time, affect how long it will last. The platters inside are spinning incredibly fast, sometimes at 10,000 rpm (revolutions per minute). Above the platters is a head that reads and writes the data. Controlling the head is a mechanism called the head actuator, which relies on a motor to move an access arm (with the attached head) slightly above the surface of the platters. Most drives have several of these platters and heads stacked extremely close together.**

If the hard drive completely fails before you can save your data, there are services specializing in recovering data from failed hard drives, even those that have endured the worst of fates. While these services don't come cheaply, when your company's data is worth thousands or even millions of dollars, the cost is inconsequential. For more information, see the "Data Recovery Specialists" sidebar in this article.

■ **The Cost Of Recovery.** Many variables are involved with data recovery. The amount of data, the type of damage the drive has incurred, the means necessary (including replacement parts) to recover the data, and the time involved can all affect the final cost of recovery. The age of the hard drive is also a factor, as it can be difficult to get the necessary replacement parts for such drives. Severely burned or water-logged drives require special sanitization procedures, adding additional fees.

This is why there is no clear-cut pricing scheme for data recovery services, and most services prefer to have you call them for an estimate. If you'd still like an idea of what to expect, Data Recovery and Reconstruction (520/742-5724; http://www.datarr.com) is one of the few vendors that presents pricing information on their Web site. We've included it here to give you a basic idea of out-of-pocket expenses. Again, keep in mind that this is just from one source; we encourage you to call several to get the best solution for your problem.

That said, you might want to sit down for this: Data Recovery and Reconstruction's base price for data recovery is $595. This includes five hours of labor and copying the recovered data to new media. According to its Web site, only 25% of jobs submitted to them fall into this range. Time in excess of five hours is billed at $60 per hour. Hard drives needing decontamination (such as seriously burned or water-logged drives) incur another $75 charge. And if you need your data as soon as possible, you can request "priority service" to receive data back as quickly as in one to two days for an additional (undisclosed) fee. The standard (non-priority) turnaround time is one week or less.

Considering you could purchase a new computer for this kind of money, think about the following statistic provided courtesy of Disktek (888/839-0949, 905/938-0393 [Canada]; http://www.disktek.com), another data recovery service. According to the National Computer Security Association, the estimated time lost and cost of rebuilding only 200MB of data in the following areas is:

| Department | Time | Cost |
|---|---|---|
| Sales & Marketing | 19 days | $17,000 |
| Accounting | 21 days | $19,000 |
| Engineering | 42 days | $98,000 |

In light of figures like these, $1,000 spent for data recovery seems more than justified.

Several data recovery services also have a "no data, no charge" policy. This means that if they can't recover any data, you don't get a bill. Fees for priority service and drive decontamination usually are not covered by this policy, but because the preliminary diagnostics are free, this means you've really got nothing to lose by attempting to recover your data (and potentially much to regain).

■ **Preparing & Packing The Drive.** So, you have a hard drive that has crashed and burned and now you need your data recovered: How do you prepare the drive for recovery? First, choose a data recovery service (see the "Data Recovery Specialists" sidebar for details) and ask its representatives how you should package and send in your hard drive. Many will suggest that you have a qualified technician *carefully* remove the drive from the computer (unless your computer is in such bad shape that this is impossible). Make the technician aware that the hard drive has failed, but you intend to send it to a data recovery service, therefore, you don't want to risk compromising the data any further.

As the recovery services will tell you, tossing the drive into a box of Styrofoam peanuts and mailing it via standard mail is also a bad move. Place the drive in an antistatic bag and, if possible, mail the drive in the box and packing material in which it was originally received. Qualified computer repair shops and technicians can probably provide an antistatic bag and possibly even boxes designed for mailing hard drives, along with packing material. Otherwise, use strong packing material such as firm foam or layers of bubble wrap, enough to create a barrier around the drive that's at least two to three inches thick. Pack the drive tightly so it is completely immobile before sealing it. Even if you plan to take the drive to a local technician, it's good to have it securely packed for transit.

In addition, check data recovery service Web sites for more details and instructions. Many have online forms that you can print, fill out, and mail in along with the drive. For shipping purposes, be sure to mark the box as fragile, and you'll probably want to use a next-day or two-day shipping service for mailing. Be sure to get a tracking number.

■ **The Bottom Line: Don't Panic.** If you're the victim of hard drive failure or some other unforeseen event, try the troubleshooting tips we've suggested or contact several companies that specialize in data recovery. As we mentioned, many of these services offer free analysis quotes, so even if one service declares your data unrecoverable, don't be afraid to get a second opinion.

On the other hand, maybe after reading this article, you will realize how critical regular backups truly are and how much money this minor task can save you, and you'll never even need these services. Now that would definitely be the best outcome. LS

*by P. Bryan Edge-Salois*

# Destroy Viruses Before They Destroy You

## Protecting Your System Is All About Prevention & Caution

You've done it dozens of times before. You receive a file over the Internet, perhaps by downloading a software program or opening an attachment sent via e-mail, and you open it. But this time, your computer is suddenly out of whack. Files mysteriously disappear, error messages start popping up, or even more insidious events occur, including your computer's inability to boot up because its entire hard drive has been erased.

You aren't the first user (and unfortunately, you won't be the last) to come face-to-face with a computer virus. Viruses wreak havoc on hundreds of thousands of machines around the world every year. With an estimated 53,000 known viruses out there (according to the McAfee.com AVERT Virus Information Library), there's a strong chance that sooner or later you'll run into one. To protect against turning the chance encounter into a long-term relationship, it's important to know what viruses are and what you can do to inoculate your system against them.

**Know The Enemy.** Simply put, a **virus** is a piece of code, usually disguised in some fashion, that attaches to another program for the purpose of spreading to other programs, files, or systems without the knowledge or consent of the recipient. And—most importantly—they are usually written with the intent of causing some undesirable event. For instance, the Chernobyl virus, which first appeared back in mid-1998, paralyzes its victims by overwriting the first part of the hard drive.

But the picture is a bit more complicated than this. There are many types of viruses and some related programs that, while not technically viruses, look, walk, and quack like them.

One of the most common types of viruses is the **file infector**. These parasites attach themselves to program files, or files that basically are lists of instructions for the computer to carry out and end with extensions such as .EXE and .COM. They typically store themselves in your computer's memory, and when you launch the program file, the virus launches, too.

A **boot-record infector** (or system infector) is like a file infector in that it infects executable code, but the difference is that the executable code is found only in the portion of a hard drive or diskette that contains the startup instructions. To explain how this works, let's assume that you get a diskette from a friend and use it. You read its other files with no problems (and without launching the virus). If you reboot the computer, however, and the diskette is still in the drive, then you have problems. When your system accesses the diskette drive as it starts, it will discover the boot-record infector on the diskette and render your system inoperable. On the bright side, now that diskettes are becoming less common, we expect the number of boot-record infector type of viruses to decrease.

Take the worst characteristics of the boot-record infectors, combine them with the file infectors, and you have a potentially deadly combination called the **multipartite virus**. These viruses slide onto your system by attaching themselves to program files, and then they alter the hard drive's master boot record, the program used to determine which partition a computer will boot from. When the master boot record is destroyed, the computer doesn't know how to find and load the operating system. Fortunately, these are some of the most difficult viruses to create, so multipartite viruses are relatively rare.

Much more common are the **macro viruses**, which tend to cause the least destruction, but are annoying nonetheless. Macro viruses work through macros, the series of keyboard and mouse actions that are tied to actions of a single key, symbol, or name. Microsoft Word contains macros; for instance, you can program Word to insert your company's name every time you type its stock symbol in a Word document. And many macro viruses are spread through this application.

As if all these viruses weren't bad enough, you also have **Trojan horses** to worry about. The Trojan horse isn't technically a virus because it normally does not replicate, but its destructiveness can still be on par with that of a true virus. Trojan horses, as the name implies, sneak onto your system by pretending to be something desirable. But once within the "gates" of your system, Trojan horses wait until some trigger event occurs—the opening of a file, for example—to start displaying messages, altering data, or destroying files.

One of the most famous Trojan horses to date is the "resume" virus, which first appeared in the summer of 2000. An e-mail message with the subject line "Resume - Janet Simons" was really a Trojan horse, and any unwitting individual who opened the attachment soon found crucial files deleted and a copy of the e-mail sent to everyone in the recipient's Outlook address book.

**Worms** are other nasty bits of code that, although they don't infect programs, replicate like rabbits and quickly consume huge amounts of hard drive space. "I love you" may be three of the sweetest words you know, but not when they're referring to the name of one of the most famous worms to hit the computer scene in the past few years. The "I Love You" worm originally appeared in e-mail messages with the subject line containing the name of the worm (variants still appear online) and a message containing an attachment named "LOVE-LETTER-FOR-YOU.TXT.vbs." Clicking the attachment caused copies of the worm to transmit to everyone in the user's Outlook address book, HTML files to be overwritten, and other undesirable behaviors.

**An Ounce Of Prevention.** The good news is that in the war against viruses, you can protect yourself from most viruses by following a few safe practices.

The first thing to keep in mind is that you don't create viruses (unless you're some type of hacker or antivirus expert); you can only receive them from others. So, if you're prudent about which files you download from the Internet or load onto your system via diskette, you'll dramatically reduce the chances of picking up viruses. Check out a Web site's credentials before downloading any files from it; many legitimate sites will state they check files with antivirus software.

E-mail is another source of viruses. Whatever you do, do *not* open an e-mail attachment unless you are sure it comes from a trustworthy source and you can be relatively certain that person meant to send it. This also means that you should set your e-mail client so that it doesn't automatically open attachments in the preview pane. If necessary, don't even display a preview pane. Simply reading an e-mail message cannot cause a virus to spread, however; the attachment is what carries the virus. (One notable exception was caused several months ago by a security bug in Microsoft Outlook and Outlook Express that affected Internet Explorer 5.0 users, but Microsoft appears to have fixed that problem.)

Using antivirus software is one of the best ways to protect your system. These software programs work by scanning your computer's memory and hard drive. When the program finds a virus, it lets you know and asks what you'd like to do, such as clean or delete certain files. Antivirus software is typically available for less than $45, and it's well worth the cost.

McAfee.com is one of the biggest names in antivirus software. McAfee.com makes a whole range of computer protection products, including the VirusScan 5.15 program ($29.95; 888/622-3331, 801/431-1503; http://store

**You can tell whether a virus is real or a hoax by visiting an online resource, such as the Virus Hoaxes section of the Symantec site, home of the Norton AntiVirus application.**

.mcafee.com), a virus eradicator that first quarantines an infected file and then lets you repair it without spreading the damage to other files on your system.

Its features include the detection of ActiveX and Java applets; an "x-ray" that scans messages before they've even been opened in cc:Mail, Eudora, Microsoft Exchange, and Outlook; and an automatic backup that will help restore your system to good health should a virus attack.

Symantec, maker of the famous suite of Norton products, offers Norton AntiVirus 2001 ($39.95; 877/255-7907, 408/253-9600; http://www.symantec.com), a program for Windows 95/98, Windows NT, and Windows 2000 (version 7.0 works with Windows Me machines). Simply install Norton AntiVirus on your system and it runs in the background, scanning files and attachments you receive by e-mail.

The program is also linked to the Web so that it automatically updates its virus definitions when you're online. Symantec's Web site also offers free technical support and virus information. Visit it to read about recent virus alerts, subscribe to a news bulletin for tips, and access virus removal tools.

If you follow all of the above tips and use antivirus software, your chances of infecting your system are miniscule, but remember that no software offers 100% protection. If a virus attacks your system, you can protect yourself from too much long-term damage by backing up *everything*. Make sure you have installation CD-ROMs or backups for your operating system and applications, as well as backups of personal data and other important files so that if a virus does infect your computer, you can replace what it has destroyed.

**Virus Hoaxes.** One final way to protect yourself against the threat of viruses is to be aware of what really might be a virus and what is perhaps just a hoax. Virus hoaxes proliferate online, and hoaxes can lead to the real thing because after seeing so many hoaxes, you may start to ignore legitimate warnings and become vulnerable to an actual attack. Plus, a virus hoax can cause you to take "protective" action when it's unnecessary, leading to lost productivity time. If you get a virus warning, be sure to check it out at a reputable Web site.

One such site McAfee.com and its Virus Hoaxes page (http://vil.mcafee.com/hoax.asp), which provides information about dozens of hoaxes, including "Join The Crew," the "Missing Child Hoax," and the famous "Good Times Hoax." Another quality online resource is Symantec's Virus Hoaxes page (http://www.symantec.com/avcenter/hoax.html).

While checking out hoaxes, installing software, and verifying the source of downloads may seem like a lot of work, keep in mind that the more familiar you are with how viruses work and what's out there, the more familiar you will be with how they can mess up your system. And, as anyone who has ever been infected with a virus can tell you, the effort is well worth it. LS

*by Heidi V. Anderson*

# Break Down Windows 98 & Me Barriers

## Tips For Jumping Through Hoops & Over Hurdles

You have it easy when you start up your PC. Simply turn on a switch. The Microsoft Windows 98 and Windows Me operating systems, on the other hand, have a Herculean task after your job is done. It reads through millions of lines of programming code; identifies and figures out what to do with all the internal and external components of your PC; and creates a platform on which application program code can function. Win98/Me then integrates all of this and tries to present itself as user-friendly.

The next few pages will offer some tips and tricks to aid in the troubleshooting of Win98/Me when it deviates from its user-friendly goal. Win98/Me includes some tools to support this troubleshooting process. The Internet is also a resource that shouldn't be overlooked. Learning to use these tools and resources will enable you to help Win98/Me along when it falls short of expectations.

■ **When Your System Freezes.** We are all too familiar with instances when Win98/Me isn't so friendly. It happens when an application you're working in stops or locks up your PC, forcing you to press CTRL-ALT-DELETE and selecting End Task or, as a last resort, Shut Down in the Close Program window. Sometimes the PC's reset or on/off switch is the only way to get the PC to respond again. Throughout these maneuvers, you pray your work has not been lost. Some applications will recover your work up to the time the PC locked up; however, you should make it a habit to save your work regularly.

A simple remedy to an application locking up your PC is to check for open applications on the Taskbar of your Desktop, right-click them, and click Close to end the application. The open applications may be trying to access the same memory space, causing the applications to collide, which then results in the inevitable freeze.

At times, you may have to consider removing the application and then reinstalling it again. Click Start, Settings, Control Panel, and double-click Add/Remove Programs. Scroll down the list, select the disruptive application in question, click the Add/Remove button, and click OK. After removing the application, restart your PC, and reinstall the application. (*NOTE: Any data that you have saved for the application will remain in the folder where you previously placed it, but it isn't a bad idea to back it up just in case.*)

■ **Meet The Device Manager.** Win98/Me can become infuriating to work with when you try to install a new device and it doesn't work (or when a device that has been working suddenly fails to function). All devices have specific device driver software enabling them to work with the PC and Win98/Me. Usually a device failure in Win98/Me is caused when a driver becomes corrupt, out of date, or missing. Some devices may need different drivers when you upgrade from Win98 to WinMe, which can be frustrating if you weren't aware that this might happen.

To prevent this from happening in the first place, check your hardware's compatibility

with Win98 or WinMe at the Microsoft Windows Hardware Compatibility List Web page (http://www.microsoft.com/hcl/default.asp). Select your hardware's category, and click Go. You can also type a vendor's name in the All Products field to narrow down the search.

Fortunately, Win98/Me comes with a Device Manager utility to help resolve device problems. Device Manager may be used to update a device driver, change device setup values, turn a device on or off, indicate if a device is working, define the resources a device uses, and indicate if the device is conflicting with another device. The Device Manager may be found by going to Start, Settings, Control Panel, and double-clicking the System icon. Or, you can double-click My Computer on the Desktop and open the Control Panel to find the System icon. In System Properties, click the Device Manager tab to list the installed device categories.

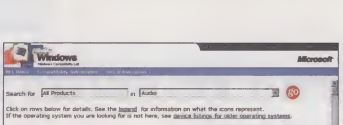
Click the plus sign (+) to the left of a device category to reveal all the devices in the selected category. Highlighting a listed device will enable you to: review its properties; refresh or restart the device; remove the device; or print the properties of a system summary, the selected device, or all the devices and a system summary.

If you see an "X" or an exclamation point (!) to the left of a device, this indicates there are problems with the device. Click the device to highlight it, and then click Properties. Sometimes the "X" means that the device needs to be enabled by just clicking the Enable Device button below the General tab.

The exclamation point may mean that the device isn't physically connected to the PC. Or, another reason may be that the driver needs to be updated. See if any of these situations are indicated on the General tab of the Properties dialog box.

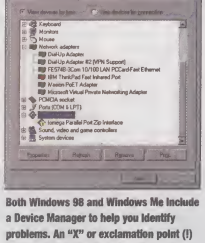
As we mentioned earlier, device drivers for Win98 may not always work in WinMe. As a rule, use the device drivers available on the respective operating system's installation CD-ROM (*not* the drivers that came with the hardware because they might already be outdated).

During device driver setup, you will need access to the installation files from the Win98/Me CD-ROM. To make the Win98 or WinMe installation files available on your hard drive, copy all the files in the Win9x directory




**It's important to check your hardware's compatibility with your Windows 98 or Windows Me system at the Microsoft Windows Hardware Compatibility List page.**

(\WIN9X) on the CD-ROM to a directory on your hard drive (C:\WINDOWS\OPTIONS\INSTALL, for example). Now, when a Device Driver Wizard appears and asks for the Win98 or WinMe CD-ROM, use that designated directory on your hard drive instead.




**Both Windows 98 and Windows Me include a Device Manager to help you identify problems. An "X" or exclamation point (!) to the left of a device indicates there are problems with the device.**

■ **Updating Device Drivers.** Sometimes, updating a device driver may just mean reinstalling the driver from those included on your Win98/Me installation CD-ROM. However, we also recommend that you periodically visit your device manufacturer's Web site to check for device driver updates to download. You may need to use this procedure even when you buy new hardware, especially for a WinMe PC. As an alternative, you can also search for the latest device drivers at WinDrivers.com (http://www.windrivers.com).

To update a device driver, highlight the device listed in the Device Manager, click Properties (you can also just double-click the highlighted device), and the General tab displays the device status and an Update Driver button. (An Update Driver button is also on the Driver tab.) Once you click the Update Driver button, the Update Device Driver Wizard appears on-screen. Select the option to search for a better driver, and click Next.

Choose where you want to search for the driver. In Win98, check (by clicking the option) the diskette or CD-ROM drive where the updated driver is located, or click the Specify Location checkbox and type the location of the updated driver. In WinMe, it will automatically search all available drives for the device drivers. In either system, you'll see a window display recommending the installation of the updated driver. Click OK, and then follow the prompts until you restart your PC.

If Win98/Me cannot find an updated driver, go back to the Search For Better Driver window, choose to display a list of all drivers, and manually install the update. In WinMe, select Specify The Location Of The Driver (Advanced), click Next, and then click Display to see a list of all drivers. Click the Have Disk button and locate the folder, or directory, that contains the update. Highlight the actual device and continue to follow the Update Device Driver Wizard until you are prompted to restart your PC.

Some vendor device driver updates can be installed without using the Device Manager method. For example, our SoundBlaster Live! digital sound card did not work on our WinMe PC. When we checked the Device Manager, clicked the Properties button, and looked below its General tab, we found that the sound card did not have all the drivers installed.

Because the specific drivers were not on the WinMe CD-ROM, we went to Creative's Web site (http://www.creativelabs.com), selected Products, chose SoundBlaster Live! from the Audio drop-down list, and then clicked Drivers on the right side of the next Web page that displayed.

Next, we scrolled down and selected Windows Me and SoundBlaster Live! in the selection windows. After that, we clicked Get Files, clicked Yes on the Internet Explorer message pop-up window, and clicked Download Driver for the 5.2MB Sblwmedrv.exe driver package.

After clicking Download Driver, agreeing to the license agreement, clicking Save The Program To Disk, and OK, we created a new

folder on our hard drive for the driver package to download in. Finally, double-clicking SBLWMEDrv.exe is all we needed to do to start installing the updated WinMe drivers. Following the instructions, the installation process took a few minutes, and then we restarted the PC.

**When All Else Fails.** If you still have problems getting a device to work, shut down Win98/Me. After unplugging (and removing, if applicable) the power cord, remove the device. If the device is inside your computer case, make sure you ground yourself to prevent static electricity discharge before opening the case and removing the device. Next, close the computer case if applicable, reattach the power cord, and start up your PC. Click Start, Settings, Control Panel, double-click System, and select the Device Manager tab. Confirm that the device is no longer listed in the category it was in before you removed it.

Now, close all the windows and shut down Win98/Me again. Unplug and remove the power cord, open the computer case if necessary (after grounding yourself), and reattach the device or put the device back into its slot on the motherboard. Close the computer case if you had to open it, reattach the power cord, and start up your PC once again. During start up, Win98/Me will "sense" the new device, launch the New Hardware Wizard, and reinstall the driver.

When you are back to your Desktop, use the Add New Hardware Wizard and install the latest Win98 or WinMe device driver. Click Start, Settings, Control Panel, and double-click Add New Hardware to display the Add New Hardware Wizard. Click Next, and Next again to enable Win98/Me to search for the device, making sure that Yes (Recommended) is activated. Click Next to start the search.

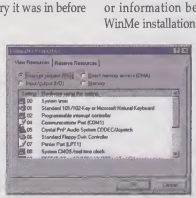
When Win98/Me detects the device, it will display the device in a list. Highlight the device and follow the wizard to install the device driver from the Win98 or WinMe installation files. (*NOTE: If you copied all the installation files as noted above, remember they are on your hard drive at C:\WINDOWS\OPTIONS\INSTALL.*)

**Your Printer Drivers.** Only the Printer icon, found when you double-click the My Computer Desktop icon, offers control over your printer's driver. You can also find this icon by clicking Start, Settings, and Printers. The Win98/Me installation CD-ROM has a vast supply of printer drivers that should cover most printers.

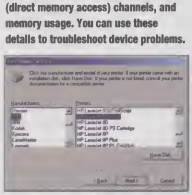
We suggest keeping the printer driver diskettes that came with your current printer away from any WinMe installation CD-ROMs or information because the drivers on the WinMe installation disc are probably more up to date.

However, if you have trouble with your particular printer in Win98/Me, visit your printer vendor's Web site and download the printer driver specific to your printer and operating system. Some common printer vendors include Canon (http://www.usa.canon.com/support/files), Epson (http://support.epson.com), Hewlett-Packard (http://www.hp.com/cposupport), and Lexmark (http://www.lexmark.com/drivers).

In addition, if you happen to have trouble with a laser printer in Win98/Me, try selecting the HP LaserJet Series II printer driver in the Add Printer Wizard. This works for most laser printers regardless of vendor because they usually comply with the Hewlett-Packard laser standard PCL (Printer Control Language) driver for laser printers.



**The Computer Properties window of the Device Manager reveals an overview of your devices' IRQ (interrupt request line) settings, input/output addresses, DMA (direct memory access) channels, and memory usage. You can use these details to troubleshoot device problems.**



**If you have trouble with a laser printer in Windows 98 or Me, try selecting the HP LaserJet Series II printer driver in the Add Printer Wizard. This works for most laser printers, regardless of vendor, because they generally comply with the Hewlett-Packard standard for PCL (Printer Control Language) drivers and laser printers.**

**With DSL Service.** If you're a user who's been enjoying the advantage of DSL (Digital Subscriber Line) broadband Internet service on your Win98 PC, this section will help you to get it to work if you upgrade to WinMe or buy a new WinMe PC.

WinMe contains significant changes to the TCP/IP (Transmission Control Protocol/Internet Protocol) stack setup that connects to the Internet. Most DSL services use TCP/IP stacks with the PPPoE (Point-to-Point Protocol over Ethernet). The PPPoE allows your ISP (Internet service provider) to convert from dial-up access to ADSL (Asymmetric DSL) service, with minimal cost to them by using its existing PPP (Point-to-Point Protocol) infrastructure. The ISP has to update their PPPoE software drivers to work with the new WinMe TCP/IP stacks.

We found two solutions to this problem. One solution is to get a multipurpose cable/DSL router/hub and connect it between your PC and the DSL modem provided by your DSL ISP. The more involved solution is to download updated PPPoE software from your ISP.

Our Verizon DSL connection worked fine because the 3Com 3C905C-TXM network card was configured during the WinMe installation, and we used a multipurpose router/hub called Linksys EtherFast Cable/DSL Router, model BEFSR41 ($150; http://www.linksys.com) with a built-in four-port switch, to connect to the DSL phone line and service. (Incidentally, cable/DSL router/hub devices will work the same way with a cable broadband connection.)

After connecting the Linksys router/hub, we didn't have to upgrade anything to re-establish our DSL service. We didn't even have to install any of the software that came with the Verizon DSL installation kit. All we had to do was just click the Connect To The Internet icon on the Win98/Me Desktop and click I Want To Set Up My Internet Connection Manually or I Want To Connect Through A Local Area Network (LAN) in the Internet Connection Wizard.

Then, we clicked Next, and clicked I Connect Through A Local Area Network (LAN) in the Setting Up Your Internet Connection window. Click Next, and Next again. Finally, set up an Internet mail account (or you can always come back to do this later), and click Finish.

The DSL router/hub solution has some added benefits. Our router/hub includes PPPoE firmware containing the PPPoE software driver embedded on a chip inside the router. During the setup of the router/hub, you'll type in the

DSL account user ID and password. Using the router/hub shields you from unstable and potentially inefficient PPPoE software drivers. The router/hub also adds embedded NAT (Network Address Translation) software, allowing several networked PCs to share a single ADSL connection. At the same time, the router/hub serves as a simple firewall, shielding any PC connected to it from Internet intruders.

If you don't use a multipurpose cable/DSL router/hub, the second resolve is to check with your ISP for a PPPoE software upgrade. Verizon has an upgrade on its Web site (http://www.verizon.net/infospeed). The Web page displays as if it's a part of the NBCi network. Click My Account near the top center of the Web page, click OK in the Security Alert window, type your username and password, and click OK. Scroll down to Service Updates, click Verizon Online DSL Release 3.0 Software Compatible With Windows Millennium, and click Download Software in the text area.

Read through the instructions and download three files: NukePoET, Verizon Online DSL Release 3.0 Software Installation Guide (and print it out as a reference), and the Windows Users Version Of The Release 3.0 DSL Connection Software (3.5).

If your ISP for DSL service doesn't have a PPPoE update available yet, there is a PPPoE software driver that works well with WinMe

## Resolve Device Conflicts

Failing device drivers can be just one of the causes of a device not working. Device Manager can reveal and resolve conflicts between devices that are trying to use the same device setup values. These conflicts can result in one of the devices not working properly. There are three setup values essential for most devices to work properly: the **I/O (input/output) port address**; the **IRQ (interrupt request lines) number**; and the **DMA (direct memory access) channel**.

**I/O port address values.** These are represented as hexadecimal (h) values, which the processor sees as a memory address it can use to send or receive data between the device and the processor. They are usually associated with parallel and communication ports.

**IRQ numbers.** This is a hardware line or path that a device can use to send interrupts (requests for service) to the processor. These interrupt lines are built into a PC's internal hardware. The number assigned to the interrupt value represents the priority level to the processor so that the processor can determine the sources and relative importance of the incoming service request.

**DMA channels.** A DMA channel is a pathway to transfer data directly between a device and memory rather that taking the longer route of transferring data from device to processor to memory. Not all devices can use DMA channels. Hard drives and sound cards are examples of devices that may use DMA channeling.

The Resources tab of a device's properties dialog box will display the setup values used. Click Start, Settings, Control Panel, double-click System, and select the Device Manager tab. Click the plus sign (+) to the left of a category to list devices in the category. Double-click a listed device to reveal its properties dialog box, and select the Resources tab. The central pane of the Resources tab lists the resource type and value settings. In the lower portion of the window, there is a Conflicting Device List pane that displays any device conflicts.

Deselecting the checkbox (by clicking it) to the left of Use Automatic Settings will enable you to change the setting of a highlighted resource. Manually changing the value settings can resolve the conflict between two devices. Since there are a limited number of setup values for I/O ports, IRQs, and DMA channels, refer to the "Standard Device Setup Values" chart that shows the standard available and assigned setting values customarily used by various devices.

We recommend viewing and/or printing an overview of the actual device setup values for your Win98/Me PC before making any changes. In Device Manager, highlight the Computer category, and click Properties to view individual device values or click Print to print an entire overview of all the device setup values. You can use this printed overview of your PC's setup values as a reference to help resolve future device conflicts. The charts on the right list the general settings used by most computer systems and devices. □

### Standard Device Setup Values

| Parallel Ports (Printer Ports) | IRQ# | I/O Address |
|---|---|---|
| LPT1 | IRQ#7 | 3BCh |
| LPT2 | IRQ#7 | 378h |
| LPT3 | IRQ#5 | 278h |
| **Communication Ports (Serial Ports)** | | |
| COM1 | IRQ#4 | 3F8h |
| COM2 | IRQ#3 | 2F8h |
| COM3 | IRQ#4 | 3E8h |
| COM4 | IRQ#3 | 2E8h |
| COM5 | IRQ#4 | 3E0h |
| COM6 | IRQ#3 | 2E0h |
| COM7 | IRQ#4 | 338h |
| COM8 | IRQ#3 | 238h |

### Available & Assigned IRQ Numbers

| IRQ# | Device Description |
|---|---|
| 0 | Interval Timer |
| 1 | Keyboard |
| 2 | Programmable Interrupt Controller |
| 3 | Serial (Communications) Port 2 |
| 4 | Serial (Communications) Port 1 |
| 5 | Available (LPT1 or Sound Card) |
| 6 | Diskette Drive |
| 7 | Parallel Port 1 (LPT1) |
| 8 | System CMOS Real-Time Clock |
| 9 | Available |
| 10 | Available |
| 11 | PCI Bus (or SCSI Interface) |
| 12 | Available (unless for PS/2 mouse) |
| 13 | Math Coprocessor |
| 14 | Primary IDE Controller |
| 15 | Secondary IDE Controller |

### Available & Assigned DMA Channels

| Channel | Device Description |
|---|---|
| 0 | Available |
| 1 | Available (or for Sound Card) |
| 2 | Diskette Drive Controller |
| 3 | Parallel Port (for ECP/EPP) |
| 4 | Cascade in Serial I/O |
| 5 | Available (or for Sound or SCSI Card) |
| 6 | Available |
| 7 | Available |

available from a site labeled as RASPPPOE (http://user.cs.tu-berlin.de/~normanb). Uninstall your current PPPoE and then install RASPPPOE after carefully reading the Readme.htm in the decompressed Zip file.

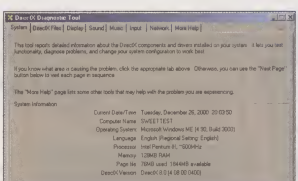
■ **A Direct Tool For DirectX.** Many of today's interactive, gaming, or instructional software use DirectX technology to deliver the multimedia effects of the product. DirectX technology is driver software that is the centerpiece of the Win98/Me multimedia experience, giving applications direct access to a PC's sound and graphics hardware. Sound and graphics hardware that is DirectX-compatible means less work for the processor.

When purchasing software, check the packaging for an indication of the DirectX version it is designed for. During installation, the application will look for the DirectX version currently installed and offer to install it if it can't find it. But before installing the new software, check your PC to see which DirectX version is installed.

Click Start, Run, type **dxdiag** in the field provided, and click OK to activate the Win98/Me hidden DirectX version and diagnostic tool program. As the program starts, it will test the various DirectX components and files of your PC and display any problems through an array of tabs: System, DirectX Files, DX Media Files, DirectX Drivers, Display, Sound, Music, Input, Network, and More Help.

This tool may be used to troubleshoot and run specific diagnostic tests for your DirectX setup. Use the Display tab to run tests on the graphic card's DirectDraw and Direct3D capacities. The Sound tab has a Test DirectSound button for testing your sound card's DirectX abilities. With the DirectMusic button, located on the Music tab, you can test the MIDI (Musical Instrument Digital Interface) and synthesizer capacities of your sound card. On the Network tab, you can test the DirectPlay features of your Internet TCP/IP, IPX (Internetwork Packet Exchange), modem, or serial connection.

■ **Upgrade To DirectX 8.0.** The current level of DirectX is 8.0. If you try to run some of the latest multimedia games, interactive or instructional software, and don't have DirectX 8.0, the software may not work correctly. You may even find that your current software will run better with DirectX 8.0 installed on your PC.




**Test your system's DirectX setup. Click Start and then Run. Type dxdiag and then click OK to display the DirectX Diagnostic Tool.**

Download DirectX 8.0 by clicking Start, Windows Update, and clicking Product Updates on the Windows Update Web page. Wait while the Web site scans your system and checks for available updates.

Now, when the Select Software Web page displays, scroll down and click the checkbox to the left of DirectX 8.0 Update listed under the Recommended Updates section. Click the Download arrow button in the upper right corner of the Web page, and then click the Start Download arrow button at the bottom of the Download Checklist. Click Yes in the Windows Update Web Page dialog box, and click Yes when prompted to restart your PC.

When your PC starts again, you'll have all the upgraded features of the latest version of DirectX, without having to wait for it to be included on the CD-ROM of your next software purchase.

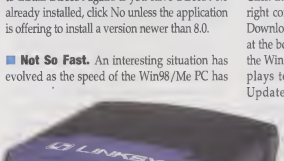
Some applications, during their software installation program, may ask you if you want to install DirectX again. If you have DirectX 8.0 already installed, click No unless the application is offering to install a version newer than 8.0.

■ **Not So Fast.** An interesting situation has evolved as the speed of the Win98/Me PC has increased. If you are one of those PC enthusiasts who now have the fastest and best PC on the block, don't be so fast to shut it down. As you use an application, your work is usually cached into either RAM or in a swap file on your hard drive. When you finish, you often save your work and move on to something else. But in many cases, your command to "save" might be cached into RAM, or the swap file, and actually written to the appropriate place on the hard drive when the processor has the time to do it.

Normally, when you shut down your computer, your system checks for any cached "save" commands and writes data to the hard drive, if necessary. What seems to occur with these super-fast PCs is that they have a tendency to shut down too fast—before the cached data has a chance to be written to an IDE (Integrated Drive Electronics) hard drive.

*(NOTE: To see if you have an IDE hard drive, click Start, Settings, Control Panel, and double-click the System icon. Select the Device Manager tab and click the plus sign to the left of Disk Drives. IDE should be indicated as a Disk Type if it you have one.)*

If you have an IDE hard drive and are computing at 1GHz or higher, we recommend running Windows Update to get a fix for this issue. Click Start, Windows Update, and Product Updates. When the Windows Update Web page appears after it has scanned your system, scroll down and click the checkbox to the left of Windows IDE Hard Drive Cache Package located under the Recommended Updates section. Click the Download arrow button in the upper right corner of the Web page. On the resulting Download Checklist page, click Start Download at the bottom of the page. Then, click OK when the Windows Update Web Page dialog box displays to start downloading the IDE Cache Update Package. Finally, click Yes when prompted to restart your PC.



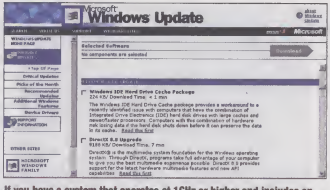

**Use a multipurpose router/hub, such as this Linksys EtherFast Cable/DSL Router, to easily configure broadband Internet service with a cable or DSL (Digital Subscriber Line) modem and home network setup.**

■ **The Hard Drive Crawl.** Over time, your hard drive stores more and more files containing your programs and data, causing it to become full and slow down. When you install a program or create files through applications, Win98/Me places them next to each other when they are initially created. The next time you use the file, Win98/Me may have to add data to it but not in its original space on the hard drive. Any new information will have

to be stored elsewhere on the hard drive. This results in a file with pieces of itself placed in different spaces on the hard drive.

Win98/Me keeps track of where all the pieces of a file are on the hard drive. As your hard drive fills up, the number of files that are fragmented (split into pieces) increases, causing your hard drive's read-write head to take longer to access the data. This file fragmentation can cause your hard drive to noticeably appear slower while opening and saving files.

To alleviate this, click Start, Program, Accessories, System Tools, and Disk Defragmenter to defragment the files on your hard drive and get it back up to speed. Once you click OK, the Disk Defragmenter will rejoin your file fragments and organize your application and data files logically on the hard drive so that they can be accessed faster. This process will usually take a considerable amount of time, especially if you have a large hard drive. We recommend that you don't use your PC until the Disk Defragmenter has finished. Using Win98/Me's Scheduled Tasks tool (also located in System Tools on the Start menu) is a good idea to prevent future hard drive delays.




**If you have a system that operates at 1GHz or higher and includes an IDE (Integrated Drive Electronics) hard drive, we recommend running Windows Update to download its fix for directing your system to finish saving data before it shuts down.**

## Use Windows Update Frequently.

Perhaps the best way to keep your Win98/Me PC working smoothly is to periodically check Windows Update (click Start, Windows Update). The Win98/Me operating system is really a work in progress. Microsoft will frequently post updates for Win98/Me to enhance its operation and features. Some of those updates can be critical updates or patches designed to repair operational or security problems discovered by users or technicians.

Win98 has a Microsoft Critical Update Notification (MCUN) utility available from the Microsoft Update Web page. When the MCUN utility is installed on your Win98 PC and you are connected to the Internet, you will be automatically notified when a critical update is available. When one of these notifications pops up, you can either click the View Critical Updates button (and download the update immediately) or Notify Me Later.

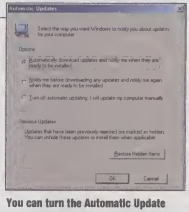
If you have Win98, you can install this utility by clicking Start, Windows Update, and Product Updates on the Windows Update Web page. Click Yes if any IE Security window appears. After Microsoft catalogs the updates available for your PC, scroll down and click the checkbox to the left of the Critical Update Notification Upgrade, located in the Recommended Updates section. Then, click the blue Download arrow button in the upper right section of the page, and click the blue Start Download arrow button on the Download Checklist. Click Yes in the Windows Update Web Page dialog box to start the download. Finally, click Yes when prompted to restart your PC. You will now be notified whenever there are critical updates available to be installed to your Win98 operating system.

Now that we've covered Win98 and how it works with Windows Update, let's move on to WinMe. WinMe includes a new update feature that will automatically check for operating system, device driver, and software patches or updates when connected to the Internet (via Windows Update).

To see if this feature is turned on for your system, click Start, Settings, Control Panel, and double-click the Automatic Updates icon. An Update icon in the image of a globe will appear in the Notification Area in the System Tray (on the far right side of the Taskbar on your Desktop). When an update is available, the Update globe icon will start to blink to get your attention. Right-click the icon and select Update Now to start the update process, or you can choose to Remind Me Later.

To keep your WinMe PC working smoothly, keep the Automatic Update feature on. If you do decide to turn it off, make sure to periodically access Windows Update and check for critical and device driver updates as you would if you had Win98. To do this, click Start, Windows Update, and Program Updates on the Microsoft Windows Me Update page. Click Yes if an IE Security window appears. After it scans your WinMe operating system, the Critical Updates will usually appear first.

Scroll down the page until you see Device Drivers. Click any critical and/or device driver updates that are suggested, and then click the blue Download arrow button in the upper right corner of the page. On the Download Checklist page, click the blue Start Download arrow button after confirming the selections. Click Yes when the Windows Update Web Page dialog box pops up. Once downloaded, the downloads will self-install. Then, all you have to do is simply click Yes to restart your PC.


Automatic Updates
Select the way you want Windows to notify you about updates for your computer
Options
Automatically download updates and notify me when they are ready to be installed
Notify me before downloading any updates and notify me again when they are ready to be installed
Turn off automatic updating. I will update my computer manually
Previous Updates
Updates that have been previously rejected are marked as hidden. You can unhide these updates or install them when applicable.
Restore Hidden Items
OK
Cancel

**You can turn the Automatic Update feature in Windows Me on or off or request notifications before any updates download to your system.**

## Turn To The Internet.

We have given you some troubleshooting tips and tricks about how to keep your Win98/Me PC running smoothly. Don't forget to also use the Internet as a resource for troubleshooting a problem with your PC. For example, we invite you to start at our Smart Computing.com site (http://www.smartcomputing.com) and use our Find Answers tool to find articles covering general information, problem solving, and upgrading questions.

Microsoft maintains its searchable Knowledge Base (http://www.search.support.microsoft.com/kb) for users to troubleshoot problems on their own. Its database of articles addresses a variety of conflicts and issues regarding their operating systems and applications. You designate the operating system or application in question, choose a search method, type a query or keywords in the field provided, and then click Go. When your query generates a list of results, peruse the list to find related topics, and hopefully, a solution. LS

*by Steven Sweet*

# Windows 98/Me Compatibility Issues

## Mend Problems Between Your Components & Windows

Your computer is a delicate piece of machinery. (Try to keep that in mind the next time you're pounding your keyboard in disgust.) Hundreds of components operating behind the scenes must work in tandem, or your computer's hardware and software won't properly interact.

Because it's the job of your OS (operating system) to monitor the interaction between all the components, it wields a lot of power in determining whether your PC's various components can work together harmoniously. Unfortunately, no OS can work in tandem with every piece of hardware and software that exists.

Consequently, you might experience some compatibility problems when you install a new OS. A computer that ran perfectly with Windows 3.1 or Windows 95 might experience a few hardware and software problems when you install a newer version of Windows, such as Windows 98 Second Edition or Windows Millennium Edition. Even after you have had your OS for a while, you may encounter problems when you install new hardware or software.

After you encounter such problems, you might be wondering (while pounding your keyboard), "Why doesn't somebody check these things ahead of time?" Actually, something—namely, Microsoft—does check such things. We'll explain how you can discover potential incompatibilities before you install Win98 or WinMe ... or at least fix the problems after the installation.

■ **Incompatibilities Are No Fun.** Even though incompatibilities are frustrating, it isn't surprising that they occur when you consider the large number of hardware and software combinations that are possible under Win98 and WinMe. We'll look at why incompatibilities often occur from the viewpoint of both parties involved.

**Microsoft.** As it develops a new OS, Microsoft makes the specifications available to hardware and software manufacturers that want to ensure their products will work under the new OS. It's obviously in Microsoft's best interest to have as many compatible products as possible with its new OS to ensure that consumers will want to buy the new OS. Microsoft can't build support for every possible component into the new OS, though, and it has to hope the manufacturers will be willing to make changes to their products to ensure compatibility. Some products slip through the cracks and aren't made compatible.

**Manufacturers.** Making products compatible with a new OS can be a hassle, especially if the manufacturers need to make major changes. Some manufacturers might release a new version or model just before receiving the specifications for a new OS, and they might decide to wait to release a compatible product until the next time they would naturally release a new version or model. Some manufacturers will wait to measure the popularity of a new OS before creating compatible products. Some manufacturers simply don't have the resources available to devote to **backward compatibility** (making older products work with new OSes); they would rather sell you a new version anyway. Some manufacturers go out of business or are acquired by other manufacturers, making backward support with new OSes awkward or even impossible.

■ **Using The Web.** Microsoft does maintain several lists of software and hardware products that have been tested and will work under Win98 and WinMe (see the sidebar for more information). Just because a piece of hardware or software isn't listed at the Microsoft Web site (http://www.microsoft.com) doesn't mean it won't work with Win98 or WinMe, though. It's impossible for Microsoft to test every application and hardware component ever made. This means your favorite component may never be tested, but it may work great under Win98 or WinMe. In addition, some manufacturers may not go through the process of obtaining certification from Microsoft, even though their products work well with Win98 or WinMe.

If an application or hardware component you want to use isn't listed at the Microsoft Web site, you may want to contact the manufacture, if possible, to see whether it's compatible with Win98 or WinMe. Many manufacturers list such information, as well as any **patches** (or software updates) required for compatibility, on their Web sites.

■ **Other Tips.** The key piece of information you'll need to know before you can determine whether your hardware or software is compatible with Win98 or WinMe is its version number (or model number for hardware). Checking the version number of most software designed for Windows is easy; just click the Help menu and the About command. You should see a version number in the pop-up window.

Checking model numbers for hardware is a little more difficult. If you still have the user guide that came with your hardware, it might list the model number. Other times, the model number might be on the hardware itself, meaning you might need to peek at the hardware's label inside your computer's case. Once you have the necessary numbers, you can search the Web, either at Microsoft's site or at the manufacturer's Web site, to find the proper drivers.

The following is a partial list of software and hardware for which you might experience compatibility problems under Win98 or WinMe. We obviously can't list every component that needs a patch here, so you may need to check with the Microsoft Web site or with the manufacturer of your hardware or software to see whether it is compatible with Win98 or WinMe, but this should give you a good start.

■ **WinMe Software.** Most of the problems between WinMe and software packages occur because the software came out before the specifications for WinMe were available. Consequently, older programs are the most likely to experience problems with WinMe.

You can solve most of these problems by upgrading to the latest version of the software (if the latest version supports WinMe). You also may be able to download a patch from some manufacturers' World Wide Web sites.

In addition to the specific problems listed below, Microsoft reports that some older software running on WinMe could have difficulty determining exactly how much free hard drive space you have. Those older programs aren't built to support **FAT32** (a 32-bit file allocation table) storage systems, which are for hard drives larger than 2GB. If you have more than 2GB free on your hard drive, these older programs probably will only report 2GB of space as being free.

Here are some specific software problems you may find when running WinMe.

**Manufacturer: Activision (http://www.activision.com)**

**Software:** MechWarrior 2 MS-DOS 1.1

**Problem:** This version of MechWarrior doesn't run correctly on WinMe.

**Solution:** Download the Mech2v11.exe patch from the Activision Web site at http://www.activision.com/downloads/149.asp.

**Manufacturer: Adaptec (http://www.adaptec.com)**

**Software:** EZ-SCSI version 5.0 and earlier versions

**Problem:** EZ-SCSI and WinMe won't run at the same time.

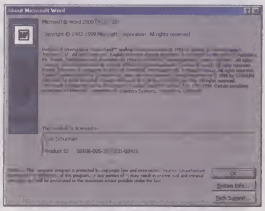
**Solution:** None. No version of EZ-SCSI is usable with WinMe, and no upgrades were available at the time of this writing.

**Manufacturer: Adobe (http://www.adobe.com)**

**Software:** Photoshop 3.0.4

**Problem:** If the hard drive on which you've installed WinMe and Photoshop 3.0.4 has more than 2GB of free space, Photoshop won't run.

**Solution:** Upgrade your version of Photoshop. The newest version is 6.0.




**Use your software's version number, which you can find using its Help menu, to determine whether you need a patch or an upgrade so it will work correctly under your operating system.**

**Manufacturer: Adobe (http://www.adobe.com)**

**Software:** Photoshop 4.0

**Problem:** When you click the software's Select menu and the Color Range command, the program might crash.

**Solution:** Visit http://www.adobe.com/support/downloads/pswin.htm to obtain the Photoshop 4.0.1 version upgrade that fixes this problem. You also can purchase Photoshop 6.0, the newest version.

**Manufacturer: America Online (http://www.aol.com)**

**Software:** America Online 5.0

**Problem:** When trying to connect to AOL the first time after installation, you receive the The Network Failed To Respond Properly error message.

**Solution:** AOL recommends upgrading to AOL 6.0 to solve this problem. For some user setups, simply dialing into AOL a second time with AOL 5.0 also works.

**Manufacturer: America Online (http://www.aol.com)**

**Software:** America Online, all versions

**Problem:** When installing AOL on a WinMe computer from the ONLINE SERVICES folder, you might receive an error message asking for a Win98 installation CD.

**Solution:** Search your hard drives for the Aol40us.exe file. Then, rename it Aol40us.old. Now, reinstall AOL from the ONLINE SERVICES folder. When prompted for your Win98 or WinMe installation CD, insert the installation CD-ROM into your CD-ROM drive, and the installation should continue smoothly.

**Manufacturer: Claris (no longer available)**

**Software:** ClarisWorks for Windows 3.0

**Problem:** If you install this application under WinMe, it will not run properly.

**Solution:** On installation disk 2, manually run the Setupcw.exe program to install patches needed to make ClarisWorks 3.0 work with WinMe.

**Manufacturer: Electronic Arts Sports (http://www.easports.com)**

**Software:** Triple Play 98

**Problem:** Using the Autorun CD-ROM feature when installing Triple Play 98 under WinMe could cause the installation program to crash and could cause your PC to crash.

**Solution:** Disable the Autorun feature in WinMe before installing Triple Play 98 from CD-ROM. Double-click the Setup.exe file on the Triple Play 98 CD-ROM to install the program. To do this, click the Start button, Settings, and then Control Panel. Double-click the System icon. Click the Device Manager tab, and click the plus sign next to CD-ROM. Click the CD-ROM drive you're using and click Properties. Click the Settings tab and remove the check mark from the Auto Insert Notification checkbox. You also can hold down the SHIFT key while inserting a CD disable the Autorun feature.

**Manufacturer: Intuit (http://www.intuit.com)**

**Software:** Quicken, all versions

**Problem:** Depending on your configuration of Quicken, you might lose your default

printer settings or customized font settings when installing WinMe.

**Solution:** You can't do anything to prevent this problem; just be aware of it and re-enter your settings after installing WinMe.

**Manufacturer: Juno (http://www.juno.com)**

**Software:** Juno 3.0.x

**Problem:** Certain versions of Juno 3.0.x simply don't work with WinMe.

**Solution:** Upgrade for free to Juno 4.0 by visiting the Juno Web site at http://www.juno.com/upgrade.

**Manufacturer: Mattel Interactive (http://www.mattelinteractive.com), formerly Broderbund**

**Software:** Where In The USA Is Carmen San Diego?

**Problem:** The software's graphics won't run properly under WinMe when the display is in 16-color mode.

**Solution:** Change your WinMe settings so you are running your display in 256-color mode. Right-click an empty spot on your Desktop and select Properties. In the Display Properties dialog box, click the Settings tab. In the Colors section, click the down arrow and select 256 Colors. Click OK.

**Manufacturer: McAfee (http://www.mcafee.com)**

**Software:** Dr. Solomon's Anti-Virus 8.x and some earlier versions

**Problem:** During the installation of WinMe, your computer might crash while creating your Startup disk.

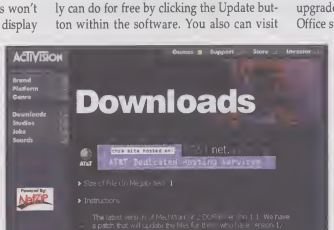
**Solution:** Either skip the creation of a startup diskette or click the Cancel button when the startup diskette progress bar reaches 20% complete. Future versions of Dr. Solomon's should correct this problem.

**Manufacturer: McAfee (http://www.mcafee.com)**

**Software:** First Aid 2000 and earlier versions; Internet Guard Dog 3.11 and earlier versions; McAfee Office 3.11 and earlier versions; and Utilities 3.01 and earlier versions

**Problem:** In some instances, the application may damage WinMe system files when you attempt to defragment your hard drive. The damage could cause your personal computer to crash. Antivirus applications not designed for WinMe may find all the viruses on your computer, but they may not eliminate those viruses.

**Solution:** In some instances, you simply can click the Update button within the software to download and install the patch needed to correct this problem. You also can visit the McAfee Web site at http://www.mcafeehelp.com for instructions on downloading the patch from the Web site. (First Aid 98 and earlier versions and Guard Dog 2.0 and earlier versions require a full product upgrade, rather than use of the patch.) McAfee reports that this patch only fixes the defragmentation issue; it does not make the software compatible with WinMe. To ensure compatibility, you need to upgrade to the latest version of the program, which you usually can do for free by clicking the Update button within the software. You also can visit the McAfee World Wide Web site for upgrading information.




**Most Web sites, such as Activision's site, contain downloadable patches to fix incompatibility problems.**

**Manufacturer: Microsoft (http://www.microsoft.com)**

**Software:** Links LS 97

**Problem:** The program sometimes doesn't set up properly in WinMe.

**Solution:** While setting up Links LS 97, select No when given the option of disabling Task Scheduler. If you select Yes, the application might minimize itself and cause your computer to crash. To solve this problem, upgrade to a newer version of Links LS.

**Manufacturer: Microsoft (http://www.microsoft.com)**

**Software:** Office 97

**Problem:** After upgrading from Win95 to WinMe, you can't install the Office 97 Service Release 1 patch.

**Solution:** Install the Office 97 Service Release 1 patch while still running Win95. Then upgrade to WinMe.

**Manufacturer: Microsoft (http://www.microsoft.com)**

**Software:** Office Standard 7.0 (Office Standard 95)

**Problem:** You might receive error messages when trying to use data-conversion tools built into the various Office programs.

**Solution:** You might be able to obtain the version 7.0b patch from Microsoft by calling (800) 360-7561. Otherwise, you will have to upgrade to a newer version of the Microsoft Office suite.

**Manufacturer: PowerQuest (http://www.powerquest.com)**

**Software:** Drive Image 3.0 and earlier versions and PartitionMagic 5.0 and earlier versions

**Problem:** These software packages may crash when used with WinMe.

**Solution:** You will need to upgrade to the latest versions of the software: Drive Image 4.0 and PartitionMagic 6.0.

**Manufacturer: Stac Software (http://www.stac.com), now called Previo (http://www.previo.com)**

**Software:** Stacker 4.1 and earlier versions

**Problem:** Computers using the Stacker disk-compression utility no longer work after installing WinMe.

**Solution:** Stacker 4.1 and WinMe are incompatible. You'll have to uninstall Stacker 4.1 before using WinMe. Stac Software, now called Previo, released no updated versions of Stacker beyond version 4.1, and it has no plans to release a patch to solve this compatibility problem.

**Manufacturer: Symantec (http://www.symantec.com)**

**Software:** Norton AntiVirus 2000 and earlier versions; Norton CleanSweep 2000 and

earlier versions; Norton Internet Security 2000 and earlier versions; Norton Personal Firewall 2.0 and earlier versions; Norton SystemWorks 2000 and earlier versions; Norton Utilities 2000 and earlier versions; and WinFax PRO 9.0 and earlier versions

**Problem:** Some incompatibilities will arise, including possible crashing of the program and inability of the program to perform its tasks properly. Antivirus programs not designed for WinMe may find all viruses on your computer, but they may not eliminate the viruses.

**Solution:** You will have to purchase an upgrade to the latest version of the program, usually version 2001; Symantec reports that because of the nature of the incompatibilities with WinMe, no patch can be made to correct the problem. For more information on the compatibility of Symantec products with WinMe, visit the Symantec Web site at http://service1.symantec.com/SUPPORT/tsgeninfo.nsf/DOCID/2000011107215039. In rare instances, the Live Update feature on Norton Utilities will download the necessary patches and make the application work with WinMe.

### Manufacturer: Symantec (http://www.symantec.com)

**Software:** Norton Backup, any version

**Problem:** WinMe requires you to reset the settings for Norton Backup before using the software.

**Solution:** Before running the program, delete the Nbackup.pif file in the NORTON BACKUP directory on your hard drive.

### Manufacturer: Toshiba (http://www.toshiba.com)

**Software:** Toshiba Windows 95 Utilities

**Problem:** This software, which was preinstalled on some Toshiba computers, isn't compatible with WinMe.

**Solution:** You must use Toshiba's Uninstall utility to remove this software before installing WinMe.

### Manufacturer: Quark (http://www.quark.com)

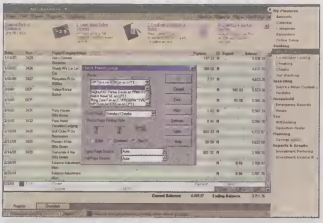
**Software:** QuarkXPress 3.3

**Problem:** When running QuarkXPress 3.3 under WinMe, you'll often receive Out Of Memory errors, causing the program to crash.

**Solution:** Visit the Quark Web site and download version 3.32, which should fix the problem. You also could upgrade to QuarkXPress 4.1, the latest version.

■ **Win98 Applications.** You won't find nearly as many software packages that are incompatible with Win98 as you found with WinMe. Most older, Win98 incompatible software packages are no longer sold, meaning any incompatible software you'll find probably will be an older package.

Unfortunately, many of the manufacturers of these older applications no longer support them. If you find an incompatibility between Win98 and an older program, you might have to do some complex Web searching to find the needed drivers. You may find it easier to simply upgrade to the latest version of the software. As long as the software was released within the past two to three years, it should support Win98. Here is a list of some Win98 software incompatibilities.



**When upgrading to Windows Me, you might lose your default printer and font settings in Quicken.**

### Manufacturer: Apple Computer (http://www.apple.com)

**Software:** QuickTime, various versions

**Problem:** Applications that attempt to use an older version of QuickTime than the one you have installed on your Win98 personal computer could yield Undefined Dynalink errors.

**Solution:** Delete all QuickTime files in that program's directory. Don't delete any QuickTime files in your hard drive's WINDOWS directory or in the SYSTEM subdirectory.

### Manufacturer: Intuit (http://www.intuit.com)

**Software:** QuickBooks 3.0

**Problem:** The program's behavior is erratic.

**Solution:** If you don't register the program immediately after installing it in Win98, you could experience display problems any time you minimize an open QuickBooks window. If you didn't register initially, try deleting the Qbw.ini file in the QuickBooks folder to correct the problem.

### Manufacturer: Mattel Interactive (http://www.mattelinteractive.com), originally Mindscape

**Software:** Chessmaster 4000

**Problem:** When dragging and moving windows, you may experience video problems.

**Solution:** Click the Win98 Start button, select Programs, and click the Windows Explorer option. Click the View menu and select the Folder Options command. Click the View tab and then remove the check mark from Show Window Contents While Dragging checkbox.

### Manufacturer: MECA (no longer available)

**Software:** Managing Your Money v2.0a

**Problem:** The software can't find Win98's Calendar.exe, Cardfile.exe, and Clock.exe files, which are used with various features in Managing Your Money.

**Solution:** Those files are not included with Win98, unless you upgraded to Win98 from Windows 3.1. If you did not upgrade from Windows 3.1, you can't use those features in the Managing Your Money application.

### Manufacturer: Microsoft (http://www.microsoft.com)

**Software:** Office 4.0

**Problem:** Office 4.0 doesn't run on Win98.

**Solution:** Win98 and Office 4.0 aren't compatible. You will have to upgrade to a newer version of the Microsoft Office suite to run it on Win98.

### Manufacturer: Microsoft (http://www.microsoft.com)

**Software:** Office 97

**Problem:** After you upgrade a Win95 computer to Win98, you can't install the Office 97 Service Release 1 patch.

**Solution:** If you want to use Office 97 Service Release 1, install it before upgrading your Win95 system to Win98.

**Manufacturer: Quark (http://www.quark.com)**

**Software:** QuarkXPress 3.3

**Problem:** When installing QuarkXPress 3.3x under Win98, the installation program might hang once it is 99% installed.

**Solution:** Simply click Continue; the program will finish installing properly.

**Manufacturer: Trilobyte (http://www.tbyte.com)**

**Software:** 7th Guest

**Problem:** The 7th Guest software package doesn't work properly with some sound cards.

**Solution:** If you experience audio problems, select Sound Blaster compatibility when running the software under Win98, regardless of the type of sound card you are using.

**Manufacturer: V Communications (http://www.v-com.com)**

**Software:** System Commander 2.28 and earlier versions

**Problem:** Such versions of System Commander aren't compatible with FAT32 file systems often found with Win98 systems.

**Solution:** You will have to upgrade to a newer version of System Commander (version 2000 is the newest version) to receive FAT32 support.

**Manufacturer: Various manufacturers**

**Software:** BIOS (Basic Input/Output System)

**Problem:** When attempting to install Win98, you receive an error saying your personal computer uses a BIOS that could lead to data loss if you run Win98.

**Solution:** Contact your personal computer's manufacturer to find out how to obtain an updated version of the BIOS that will work with Win98.

## Microsoft Approved

Microsoft offers a few areas of its Web site for finding hardware and software products that it has deemed as compatible with Windows OSes (operating systems).

**HCL (Hardware Compatibility List)**

The Microsoft WHQL (Windows' Hardware Quality Labs) test hundreds of hardware products, and it deems whether the products are usable under each version of the Windows OS through the HCL. The home of WHQL is on the Microsoft Web site at http://www.microsoft.com/hwtest/default.asp. This area of the site provides an explanation of the procedures followed by the WHQL.

To use the HCL (http://www.microsoft.com/hcl/default.asp), type the manufacturer's name in the Search For The Following text box. Then select the type of hardware for which you want to search in the In The Following Types text menu. Click Go.

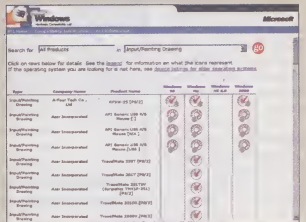
All matching products will be in a grid, showing you which models and brands are compatible with various versions of Windows, including Windows Me and Windows 98. When you click the listing of a product, Microsoft will let you know whether a new driver is available for the product and whether the labs tested the product under each version of Windows. Visit http://www.microsoft.com/hcl/include/legend.asp on Microsoft's site for an explanation of each logo used in the grid.

**Windows Compatible Products**

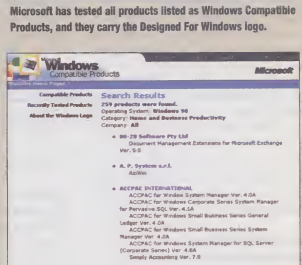
Microsoft also maintains a list of software and hardware products that are compatible with Win98 and Windows NT 4 at the Windows Compatible Products home page (http://www.microsoft.com/windows/compatible). Products listed through this page carry the Designed For Windows logo. Unfortunately, products compatible with WinMe aren't yet listed at this site. However, you can find WinMe tested hardware on the Microsoft site at http://www.microsoft.com/windowsME/upgrade/compat/default.asp.

To search for Win98 or NT products, first click the Hardware or Software radio button. In the Operating System text menu, select your OS. In the Product Category text menu, select the type of product for which you want to search or select All if you want to search for all products from a particular manufacturer. In the Company Name text menu, select the manufacturer you want or select All if you want to search for all products from all manufacturers in a particular category. Type the number of entries you want to see on the results page and click Go.

On the WinMe tested hardware page, you just need to select the Company Name, Product Category, and Product Name for the hardware you want to make sure is compatible. Just click Go after you enter all the pertinent information. ☐




**Microsoft has tested all products listed as Windows Compatible Products, and they carry the Designed For Windows logo.**


Windows
Compatible Products
Microsoft
Compatible Products
Recently Tested Products
About the Windows Logo
Search Results
259 products were found.
Operating System: Windows 98
Category: Home and Business Productivity
Company: All
80-20 Software Pty Ltd
Document Management Extensions for Microsoft Exchange Ver. 5.0
A. P. Systems s.r.l.
AzzWin
ACCPAC INTERNATIONAL
ACCPAC for Window System Manager Ver. 4.0A
ACCPAC for Windows Corporate Series System Manager for Pervasive.SQL Ver. 4.1A
ACCPAC for Windows Small Business Series General Ledger Ver. 4.0A
ACCPAC for Windows Small Business Series System Manager Ver. 4.2A
ACCPAC for Windows System Manager for SQL Server (Corporate Series) Ver. 4.0A
Simply Accounting Ver. 7.0
Accubal Systems
Accubal Pro Ver. 4.0
BidWinner Ver. 4.0
BidWinner Plus Ver. 4.0
ChangeOrder Ver. 4.0
ChangeOrder Pro Ver. 4.0
PowerBid Ver. 4.0
ADS Software GmbH
E-Connect Profi Ver. 2.1

**The Hardware Compatibility List at Microsoft's Web site contains updated drivers for some products.**

■ **WinMe Hardware.** Hardware problems with WinMe are common because many hardware components were released before Microsoft finalized WinMe's specifications. Some hardware manufacturers have been a little slow in creating and releasing drivers to support WinMe because they have been waiting to see how popular the new OS will be before deciding whether it is worth supporting it with updated drivers. However, we would expect most major hardware manufacturers to support WinMe in the near future. Here are some potential hardware conflicts you will find between components and WinMe.

**Manufacturer: Epson (http://www.epson.com)**

**Hardware:** Various Epson scanners, including Perfection 1200 USB

**Problem:** The Epson scanner returns an error message when you attempt to scan an item.

**Solution:** Obtain an updated driver from Epson that supports WinMe. Visit The Epson Web site at http://support.epson.com for more information.

**Manufacturer: Lexmark (http://www.lexmark.com)**

**Hardware:** Various printer models

**Problem:** Lexmark printers using driver LEXBCE version 1.03 or earlier are incompatible with WinMe. During installation, WinMe will automatically disable these types of drivers.

**Solution:** Visit the Lexmark Web site at http://www.lexmark.com/us_home.html and search for the updated driver you need.

**Manufacturer: Logitech (http://www.logitech.com)**

**Hardware:** Keyboards

**Problem:** You can't program the Internet keys on Logitech's iTouch keyboards using USB (Universal Serial Bus) connections while you are using WinMe. Keyboards using Key Commander software don't work with WinMe.

**Solution:** Logitech is expected to offer a patch for iTouch keyboards that should be available by the time you read this at http://www.logitech.com/cf/support/kybfiles_itouch.cfm. Because Logitech no longer manufactures Key Commander keyboards, it doesn't plan to offer a patch for these keyboards.

**If you want to install the Microsoft Office 97 Service Release 1 patch, install the patch before upgrading from Windows 95 to Windows 98 or Windows Me.**

**Manufacturer: Hewlett-Packard (http://www.hp.com)**

**Hardware:** Various DeskJet and Professional series printers (usually older models)

**Problem:** Some or all the printing functions on your HP printer are inaccessible after installing WinMe.

**Solution:** Make sure you install the latest drivers from the WinMe installation CD-ROM. You also can download them from the HP World Wide Web site at http://www.hp.com/cposupport/printers/support_doc/bpd08368.html.

**Manufacturer: Iomega (http://www.iomega.com)**

**Hardware:** Various Zip drive models

**Problem:** When attempting to format a Zip disk, you may receive a fatal error message.

**Solution:** You need to obtain an updated device driver that provides support for WinMe from the Iomega World Wide Web site at http://www.iomega.com/software/drivers.html.

**Manufacturer: Logitech (http://www.logitech.com)**

**Hardware:** Mice and other pointing devices

**Problem:** Logitech pointing devices running Logitech MouseWare driver versions earlier than 7.2 do not work with WinMe. C-Series pointing devices from Logitech do not work with WinMe.

**Solution:** Visit the Logitech Web site at http://www.logitech.com/cf/support/mousefiles_wme.cfm to find the latest MouseWare driver for your hardware. If you're using a C-Series pointing device, you'll have to upgrade to a newer device; you can't make C-Series devices work with WinMe.

**Manufacturer: Logitech (http://www.logitech.com)**

**Hardware:** QuickCam cameras

**Problem:** Some models of QuickCam cameras will not work under WinMe, especially those using QuickCam software version 5.3 or earlier versions.

**Solution:** Visit the Logitech Web site at http://www.logitech.com/cf/support/videolist.cfm to find the latest drivers.

**Manufacturer: Microsoft (http://www.microsoft.com)**

**Hardware:** Various Microsoft mouse models

**Problem:** Mice running IntelliPoint version 1.00 lose some features under WinMe.

**Solution:** Visit the Microsoft Web site at http://www.microsoft.com/products/hardware/mouse/driver/3_2/default.htm to obtain a device driver that Microsoft deems as being compatible with WinMe.

**Manufacturer: Microsoft (http://www.microsoft.com)**

**Hardware:** Microsoft Natural Keyboard

**Problem:** When upgrading to WinMe, a Microsoft Natural Keyboard running IntelliType software version 1.20 or earlier could cause WinMe's installation to crash.

**Solution:** Install the latest version of IntelliType before attempting to install the WinMe OS. Visit http://www.microsoft.com/keyboard/download/pc/download_pc.htm at the Microsoft Web site for more information on this solution.

**Manufacturer: Samsung (http://www.samsung.com)**

**Hardware:** Some USB keyboards

**Problem:** Hardware components plugged into the keyboard's hub often do not work correctly because the keyboard tells WinMe the hub contains its own power source when it doesn't have its own power source.

**Solution:** You can't fix this problem so you will have to use only low-powered USB devices with the hub, or you will have to use self-powered devices.

**Manufacturer: Toshiba (http://www.toshiba.com)**

**Hardware:** Various PCs in the T400, T2100, T2400, T3600, T4700, T4800, and T4900 series

**Problem:** Toshiba computers running a BIOS version older than 5.0 may experience a variety of problems while using WinMe.

**Solution:** Toshiba recommends a BIOS upgrade to version 5.0. You can call Toshiba support at (800) 457-7777 for more information.

**Manufacturer: Various manufacturers**

**Hardware:** Video cards

**Problem:** After upgrading from Win95 to WinMe, certain display control functions are no longer available or no longer work correctly.

**Solution:** Chances are WinMe has replaced your video driver with a generic driver that is compatible with WinMe. Most generic drivers don't support display control features beyond the basics. You'll need to contact the video card's manufacturer to obtain a new driver that's compatible with WinMe.

■ **Win98 Hardware.** Hardware problems between older components and Win98 are common, mainly because most Win3.1 drivers don't support Win98. Those who skip the Win95 upgrade and jump directly from Win3.1 to Win98 probably will experience the most problems with hardware incompatibilities.

Finding Win98 drivers for your older hardware is a little easier than finding drivers for software; hardware manufacturers seem to do a better job of supporting older components than do software manufacturers. Here is a list of some incompatibilities between Win98 and various hardware components.

**Manufacturer: Canon (http://www.canon.com)**

**Hardware:** Various Color Bubble Jet printers, including BJC-600, BJC-800, and BJC-4000

**Problem:** Some printing problems may occur after upgrading from Windows 3.1 or 95 to Win98.

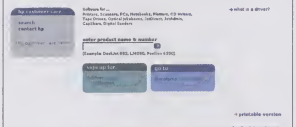
**Solution:** The drivers used in older versions of Windows usually aren't compatible with Win98, meaning you must substitute generic drivers, which could cause performance problems. Visit Canon's Web site at http://128.11.41.160/techsupport/downloads/index.html for information on downloading new drivers.

**Manufacturer: Epson (http://www.epson.com)**

**Hardware:** Epson ActionNote 866C PC

**Problem:** Frequent General Protection Faults and crashes may occur.

**Solution:** From the Win98 installation CD, copy the WB16off.exe file into your WINDOWS directory on your hard drive. Add c:\windows\wb16off.exe to your Autoexec.bat file.




**Searching for updated drivers is easy at most Web sites from major manufacturers, such as Hewlett-Packard.**

**Manufacturer: Genius (http://www.genius-kye.com)**

**Hardware:** Some three-button mice

**Problem:** The third button on some Genius mice doesn't work under Win98.

**Solution:** The generic mouse drivers included with Win98 don't include support for three-button mice. You can download and install the proper drivers from the Genius site at http://www.genius-kye.com/genius/download/d-hot.htm or from your Win98 installation CD.

**Manufacturer: Hewlett-Packard (http://www.hp.com)**

**Hardware:** Various DeskJet and OfficeJet printers

**Problem:** Your printer may not work properly or may print with a poor quality after upgrading from Win3.1 to Win98.

**Solution:** After upgrading to Win98, delete the malfunctioning printer by clicking the Start button, Settings, and Printers. Right-click the printer and select Delete. Then double-click Add Printer to reinstall the printer. Visit http://www.hp.com/cposupport/software.html for information on downloading an updated driver or install the driver from the Win98 CD.

**Manufacturer: Hewlett-Packard (http://www.hp.com)**

**Hardware:** Various models of flatbed scanners, including IIc, IIcx, and 6100c.

**Problem:** After installing the drivers from the Win98 installation CD for the scanner, a few features aren't available.

**Solution:** Install the drivers for the scanner from the scanner's CD, rather than using the drivers provided on the Win98 CD.

**Manufacturer: IBM (http://www.ibm.com)**

**Hardware:** ThinkPad 750 computer models

**Problem:** Most power-management features are unavailable through Win98.

**Solution:** You'll need to download an updated BIOS from IBM at http://www.3.software.ibm.com/download to improve your power-management options.

**Manufacturer: Iomega (http://www.iomega.com)**

**Hardware:** Various Jaz drives

**Problem:** When formatting a Jaz disk using the FAT32 file system, you could lose several functions for the disk, including write- and password-protection if you're using an older version of the Iomega drive software.

**Solution:** Visit the Iomega Web site at http://www.iomega.com/software/drivers.html to find the latest driver.

**Manufacturer: Panasonic (http://www.panasonic.com)**

**Hardware:** Various Panasonic printers, including KX-P6100 and KX-P6500 models

**Problem:** After upgrading from Win3.1 to Win95 or Win98, the printer may not work properly, returning an Unknown Windows Version error message.

**Solution:** Visit the Panasonic site at http://www.panasonic.com/support/software/prines.html to find information on the latest drivers.

**Manufacturer: SyQuest (now is known as SYQT, http://www.syqt.com)**

**Hardware:** Various high-capacity removable storage drives

**Problem:** On systems where the Squtdrv.sys file is included in the Config.sys file, changing to a FAT32 file system when running Win98 could cause a system crash immediately after startup.

**Solution:** Remove any reference to Squtdrv.sys in the Config.sys file. Install FAT32-compatible drivers from the Drivers directory on the Win98 installation CD. LS

*by Kyle Schurman*

eMail
1 new message
Daddy,
here's what i did today.
i flew over tall buildings.
i fought bad guys.
i ran really fast.
come home soon.
i want to play
Done
Reply
Save
Palm Powered™ handhelds deliver just about everything you want from the Net.

ike an email from your son, or even a favorite bedtime story. Simply amazing.
palm
Simply Palm
palm.com

# Windows 98 & Me Error Lingo

## Once You Understand The Messages, Most Solutions Aren't Hard To Find

To err is human, but to really foul things up you need a computer. This old saying may make you laugh, but chances are you aren't laughing when your computer displays an error message. Error messages are frustrating for two reasons: one, they signify that your system isn't running as smoothly as it should, and two, they're so difficult to decipher that sometimes they may as well be written in Hindi.

Well, here's some help with the translation. If you're stumped by a Windows 98 or Windows Me error message, look at our overview of some of the more common error messages related to your computer's OS (operating system), as well as what you can do to help solve the problems they accompany.

**Error Message:** During the installation of Win98 or WinMe, you receive an error message. It may be of the form "invalid product key," and your computer stops responding.

**Solution:** Whether you're performing a "clean" installation (that is, installing the OS on a PC that has no version of Windows) or upgrading to WinMe, this error message may kick in if you don't turn off the virus-detection software before you run the OS software setup program. Check your antivirus program documentation for instructions about how to temporarily disable it, then turn the program back on once you've completed the OS installation. If this occurs during an upgrade, you may need to start the existing version of Windows without loading extra drivers. (For more information about drivers, see "Break Down Windows 98 & Me Barriers" in this issue.)

**Error Message:** Invalid system disk.

**Solution:** When your computer boots up, it looks to various drives for instructions on how to locate the instructions for startup. Many systems default to the A:/diskette drive, and not finding any information there, they move on to the hard drive (usually the C:/ drive). That way, if your computer has trouble with the OS, you can repair it by simply placing an uncorrupted OS diskette in the diskette drive. But if you leave another diskette in the drive, perhaps one on which you've copied basic text files, the computer does not know how to read the diskette, and it returns this error message. Just pop the diskette out, hit any key (such as the space bar), and the computer should start right up.

**Error Message:** Improper shut down detected. Checking disk for errors.

**Solution:** Technically, this isn't really an error message, unless you consider it an indication of operator error. When you turn off the computer without going through the proper motions—going through the Start button and the Shut Down selection—your machine knows there's a potential problem, such as files weren't saved and may need to be recovered. It takes the time to check your system, and all you need to do is wait a few minutes before your system is back to normal. If you know your hard drive is fine, you can bypass this checkup by pressing the X key, but we don't recommend that you make a habit of shutting down and restarting in this fashion.

**Error Message:** A fatal exception <XY> has occurred at xxxx:xxxxxxxx.

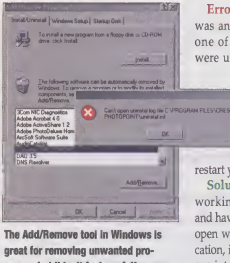
**Solution:** If you replace the "XY" with a specific processor error code, and the string of lowercase x's with numbers, then you have what is known as a fatal exception error, which is a virulent processor error that is as serious as the error message is long. (Just in case you're curious, we'll tell you that Microsoft defines the number represented by the x's as "the enhanced instruction pointer to the code segment and the 32-bit address is the actual address where the exception occurred," but you don't need to know that to deal with this error message.)

When a program runs into access problems with an illegal instruction, invalid data or code, or an invalid privilege level, the processor chokes, and in many cases, the system must

be restarted or shut down. Windows doesn't really cause these errors, but rather, it is reacting to the programs that do so. Unfortunately, your only choice is to simply restart your machine.

**Error Message:** "An error occurred while trying to remove *<Program Name>*. Uninstallation has been canceled." or "Can't open uninstall log file C:/*path name.*"

**Solution:** We've all done it: used the Add/Remove tool in Windows to sweep unwanted programs out of our hard drive. But occasionally, you won't be able to remove programs this way. Why? Perhaps you already manually attempted to delete a program that is listed here. The solution? Well, there is one, but we don't want to include it here. It involves going into the Registry, the database containing all the information Windows needs to keep track of your hardware and software, and everyone shouldn't trifle with this task. If you're an advanced user and comfortable with editing the Registry, view the Help file in the Registry Editor, but remember that a simple key error can destroy the Registry, so be sure to back it up before editing. For more information about editing and backing up the Registry, see "The Windows 98 & Me Registry" in this issue.


Install/Uninstall
Windows Setup
Startup Disk
To install a new program from a floppy disk or CD-ROM drive, click Install.
Install...
The following software can be automatically removed by Windows. To remove a program or to modify its installed components, select it and click Add/Remove.
3Com NIC Diagnostics
Adobe Acrobat 3.0
Adobe Acrobat Info 1.2
Adobe PhotoDeluxe Hom
AnaSoft Software Suite
Apple Updates
DAD 7.5
DMS Resolver
Can't open uninstall log file C:\PROGRAM FILES\CPE SOFTCH PHOTOPOINT\uninstall.inf
OK
Add/Remove...
OK
Cancel

**The Add/Remove tool in Windows is great for removing unwanted programs, but it isn't foolproof. You may see an error message such as this one.**

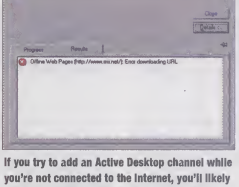
**Error Message:** There was an internal error, and one of the windows you were using will be closed. It is recommended that you save your work, close all programs, and restart your computer.

**Solution:** When you're working with a program and have multiple windows open within that one application, it's possible you will run into this error message. It often means that one of the windows has a problem (for instance, if you're surfing the Web and viewing multiple pages, maybe one page has some error code on it,) and it is the window that will be closed. But at other times, this error message may indicate that the entire program will close. If you can, save the work in the other open windows within the program before closing it, then save and close any other work before restarting your computer.

**Error Message:** Windows cannot access the specified device, path, or file. You may not have the appropriate permissions to access the item.

**Solution:** This error message may sound severe, but it's really a fairly minor issue. Select multiple icons on the Desktop, including Internet Explorer, and then press the ENTER key on your keyboard, and you'll likely run into this error message. To avoid seeing this error message (you guessed it), don't select multiple icons on the Desktop, including IE, and then press ENTER.

By the way, Microsoft notes that this is a problem with WinMe, but it does not appear to be an issue with any earlier versions of Windows.




**If you try to add an Active Desktop channel while you're not connected to the Internet, you'll likely see the synchronization error message. All you have to do to fix it is log on, and then repeat the process as described.**

**Error Message:** Run ScanDisk before Disk Defragmenter (not the exact wording of the message, but this is the gist of it).

**Solution:** In WinMe, ScanDisk helps to identify and fix cross-linked files. If you try to run Disk Defragmenter before cleaning up those files with ScanDisk, however, you may see this error message. Run ScanDisk first to save yourself a step. Click the Start button, Programs, Accessories, System Tools, and ScanDisk. Then, follow the on-screen instructions.

**Error Message:** Explorer has caused an error in Kernel32.dll (or "unknown" or "*file name*.cpl").

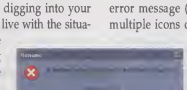
**Solution:** The Control Panel is the home to Windows tools that lets you modify some aspects of the interface, such as colors, fonts, keyboard, printer, sound, and screen savers. When the WINDOWS\SYSTEM folder in WinMe computers has a control panel file (with the .CPL extension) that is damaged or otherwise incompatible with the OS, this error message may appear and suddenly shut down the computer. It's fairly easy to fix, though, if you follow Microsoft's recommendations.

First of all, start your system in Safe Mode. In WinMe, hold down the CTRL key while the PC is booting up to choose Safe Mode. (*NOTE: Microsoft documents that this error message only applies to WinMe.*)

Next, click the Start button, Search, For Files Or Folders, and type ***.cpl** in the Search For Files Or Folders Named field. Click Search. Now, noting the original file names. In the Search Results pane, right-click a .CPL file in the WINDOWS\SYSTEM folder, and click Rename. Rename the Mca.cpl file first (if it exists), and also rename the first file in the Search Results pane to an .OLD file extension. So, if the file name is File.cpl, rename the file to File.old. Also, note which file you have renamed on the list of original file names.

To see if this worked, try to open the Control Panel. Keep repeating this process until you can open the Control Panel, and verify that the last file you renamed is the

As with the above error message, Microsoft's recommended fix involves digging into your Registry. So, you can either live with the situation or see what editing the Registry entails by reading "The Windows 98 & Me Registry" in this issue, and then visiting Microsoft's Knowledge Base for detailed instructions.



**When naming files, be sure to avoid characters such as: \/:*?"<>|**

damaged or incompatible file. Then, rename all of the files you renamed back to the original file names, except for the file that you determined is causing the issue. Reboot, and you should be fine.

**Error Message:** This program is not responding. It may be busy, waiting for a response from you, or it may have stopped running.

**Solution:** Patience really is a virtue, but if a program stalls on you for whatever reason and this message appears, end the task after a few minutes and open the application again. You may wish to reboot, as well.

**Error Message:** A file being copied is older than the file currently on your computer.

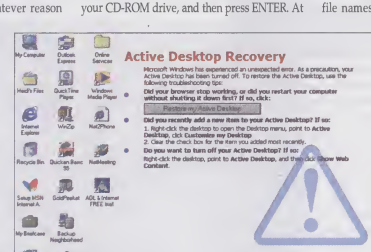
**Solution:** As a warning rather than an error message, this alert pops up when you attempt to replace a file already on your system by copying over it with a file that is older. For instance, let's assume that you have a driver for a printer, and you attempt to install an older driver with the same name over it. In most cases, you'll want the latest version of the software on your computer, so the "error message" simply serves as an alert that this replacement is probably a mistake. Almost always, you'll probably decide to click Yes to abort the copying process. If the newer driver on your system doesn't work, backup the newer version before installing and running the older file.

**Error Message:** "...an exception 03h in module..."

**Solution:** Those who upgrade to WinMe and then use Microsoft's disk defragmenter or another tool for reorganizing a drive so it isn't so scattered may have run into this error message, and it typically occurs the next time you start your machine after defragmentation. To fix it, Microsoft recommends the following: Insert the WinMe startup diskette, restart your computer, and choose Start Computer With CD-ROM Support from the startup menu. Type the following commands, pressing ENTER after each command, where *windows* is the name of your WINDOWS folder:

```
c:
cd windows\system
ren user32.dll user32.dlx
ren gdi32.dll gdi32.dlx
ren winmm.dll winmm.dlx
a:
smartdrv.exe
ext.exe
```

Then, when prompted, Please Enter The Path To The Windows CAB Files, type *cd-rom*:\win9x, where *cd-rom* is the drive letter for your CD-ROM drive, and then press ENTER. At the next prompt (Please Enter The Name(s) Of The Files You Want To Extract), type user32.dll gdi32.dll winmm.dll, and then press ENTER.


Active Desktop Recovery
Microsoft Windows has experienced an unexpected error. As a precaution, your Active Desktop has been turned off. To restore the Active Desktop, see the following troubleshooting tips:
Did your browser stop working, or did you restart your computer without shutting it down first? If so, click:
Restore my Active Desktop
Did you recently add a new item to your Active Desktop? If so:
1. Right-click the desktop to open the Desktop menu, point to Active Desktop, click Customize my Desktop.
2. Clear the check box for the item you added most recently.
Do you want to turn off your Active Desktop? If so:
Right-click the desktop, point to Active Desktop, and then click Show Web Content.

**Putting your computer on standby or into hibernation is a good way to manage your power resources, but doing so opens up the possibility of seeing a number of error messages. This one appeared when our computer was placed on standby with several programs still running.**

Next, at the Please Enter The Path To Extract To prompt, type *drive*:*windows*\system, where *drive*:*windows* is the drive and folder in which Windows is installed, and then press ENTER. If the information is all correct, press Y, and then ENTER. Type the following commands, where *windows* is the name of your WINDOWS folder, pressing ENTER after each command:

```
c:
cd \windows
ren cmapieng.vxd cmapieng.vxx
```

Restart your computer and defragment the drive again. For more information, see Microsoft's searchable Knowledge Base (http://search.support.microsoft.com/kb).

**Error Message:** Rename: A filename cannot contain any of the following characters: \/:*?"<>|

**Solution:** Depending upon your computer, when you attempt to name a file that includes any of the above characters, the OS will either present you with this error message or simply not let you save the file. (In our experience, WinMe users will not be able to save the file, while Win98 users will see the error message.) Windows assigns special meanings to certain characters, and that's why these characters aren't allowed to be used in file names. As for recommending a solution, we won't insult you by telling you not to place these characters in the file name.

**Error Message:** Cannot delete *Filename*. Access is denied. The source file may be in use.

**Solution:** Speaking of file names, when WinMe users try to delete an image from the MY PICTURES folder or from another folder, they may receive the above error message. In addition, Microsoft notes that if Web view is enabled and you open the My Pictures folder or any customized folder that uses the Image Preview template, selected images display in the Image Preview window and are considered "in use." So, while the image is being drawn, a "Generating preview..." message displays in the Image Preview window and the file locks up so you cannot delete it. You can disable Web view via Folder Options in the Tools menu. Click the General tab's Use Windows Classic Folders option. (This error message does not appear to occur in Win98.)

**Error Message:** "WUAUCLT has caused an error in unknown." or "WUAUCLT will now close."

**Solution:** WinMe has a new feature, Automatic Updates, that lets users easily schedule updates of their PCs. Those who have upgraded to WinMe from a Win98 Second Edition system using ICS (Internet Connection Sharing) may experience this error, and the workaround is to uninstall ICS, and then reinstall it.

First, double-click the Control Panel's Add/Remove Programs icon, and on the Windows Setup tab, click Communications, Details, and then clear the Internet Connection Sharing checkbox. Click OK to close

the dialog box, and then restart the computer. Connect to the Internet directly (without using ICS), accept the Automatic Updates End User License Agreement, and then reinstall ICS through the Add/Remove Programs icon, following the on-screen instructions to run the Home Networking Wizard.

**Error Message:** "The following file is missing or corrupted: C:\WINDOWS\Ifshlp.sys" or "The Microsoft Installable File System Manager cannot find the helper driver. Please ensure that IFSHLP.SYS has been installed."

**Solution:** Peculiar to WinMe computers only (this does not seem to occur in earlier versions of Windows), this message typically appears when the machine first starts up. It has a number of causes, including several corrupted system files, but they are rather complicated. If you can reinstall the OS without losing valuable information, we recommend that you do so. If not, access the Microsoft Knowledge Base and search for article Q129605.

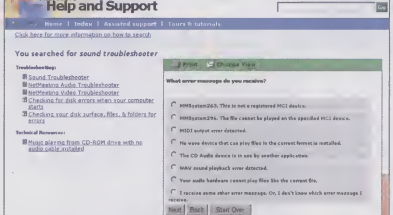
**Error Message:** Receiving a network resources error, or audio device error, or port error, or PCI bus error, or generic device error

**Solution:** Putting your computer on standby or into hibernation is a good way to manage your power resources, but doing so opens up the possibility of seeing a number of error messages. For instance, if you try to go on standby while sharing resources (such as a program or document) over a network, you'll see the network resources error message. (In such a case, close the files first.) Or, if a program is using your modem, you may see the port error message.

Another example of this type of error occurs when a device driver is preventing standby or hibernation. Advanced users can solve this by exploring the Susfail.txt file. See Microsoft Help And Support's power management troubleshooter for more information.

**Error Message:** The selected disk drive is not in use. Check to make sure a disk is inserted.

**Solution:** At first glance, this may seem to fall under the "duh" category. You try to open a file from a diskette drive, and if there's no diskette in the drive, this message appears. But what if a disk *has* been inserted in the disk drive? In this case, it may not be an OS error; it may be a hardware problem. The diskette may be damaged, and therefore, considered unreadable. Or, you may have a more serious problem, such as a damaged diskette drive. Try inserting another diskette to see if your system can read any files off that drive, and if not, contact your computer's manufacturer.


Help and Support
Microsoft Help and Support
Search
Home | Index | Assisted support | Tours & tutorials
Click here for more information on how to search
You searched for sound troubleshooter
Troubleshooting:
Sound Troubleshooter
NetMeeting Audio Troubleshooter
NetMeeting Video Troubleshooter
Checking for disk errors when your computer starts
Checking your disk surface, files, & folders for errors
Technical Resources:
Music playing from CD-ROM drive with no audio cable installed
Print
Change View
What error message do you receive?
MMSystem260: This is not a registered MCI device.
MMSystem294: The file cannot be played on the specified MCI device.
MCI] output error detected.
No wave device that can play files in the current format is installed.
The CD Audio device is in use by another application.
WAV sound playback error detected.
Your audio hardware cannot play files like the current file.
I receive some other error message. Or, I don't know which error message I receive.
Next
Back
Start Over

**Microsoft Help And Support can walk you through troubleshooting sessions to discover solutions for numerous Windows error messages.**

**Error Message:** Error Reading CD-ROM in Drive D: (or the letter of your CD-ROM drive). Please insert CD-ROM *XX* With Serial Number *XX* in Drive D: . . . if the CD-ROM is still in the drive, it may require cleaning.

**Solution:** (This error message applies specifically to Win98.) Suppose you're happily reading data from a CD-ROM and you mistakenly hit the eject button. Your OS is still trying to read that data, so it may present you with this error message. The quick fix is to press the ESC key and cross your fingers, hoping that the program won't crash or else you may find the computer frozen and need to reboot it with the reset or on/off button. Sometimes damaged CD-ROMs will cause this message. If that's the case in your situations, you can try cleaning the disc.

**Error Message:** This task is taking longer than expected. Do you want to continue waiting?

**Solution:** (This message applies only to WinMe OSes.) When new software is released, sometimes it takes time and user perseverance to locate all the bugs. One bug you may encounter with WinMe happens when closing Microsoft Word 2000 documents. If you launched the document from the StartUp menu when WinMe starts, it may take up to 60 seconds for the error message to appear after you attempt to close the document, and then clicking No will put a "close" command into effect. To avoid this error message, the easiest fix is to open the document after you start WinMe.

**Error Message:** "The share name was not found. Be sure you typed it correctly." or "The location you requested is not allowed as a target. Please choose a new location."

**Solution:** My Documents, the folder on the Desktop where often-accessed files are stored, is a quick and easy path to important files—most of the time. Occasionally, though, double-clicking or right-clicking the icon will launch the aforementioned error message (or none at all) and the folder will not open. The cause lies in the computer's networking capabilities; if the folder has been redirected as a network shared resource that renders it unavailable, the folder will not open. If you're connected to a network at work, notify the system administrator. You can also work around this problem by right-clicking the My Documents icon, selecting Properties, and on the Sharing tab, change the location from a network-shared resource to a local folder.

**Error Message:** Errors occurred while Windows was synchronizing your data.

**Solution:** You may already be familiar with Active Desktop, Microsoft's enhancement that sends Web content directly to your Desktop. To set up Active Desktop channels, all you need to do is right-click the Desktop, select Active Desktop, and then choose New Desktop item. Type in the site's **URL** (**uniform resource locator**; a Web address), and online content streams to your Desktop, without needing a full browser window. But if you try to add a channel while you're not connected to the Internet, you'll likely see the synchronization error message. It's easy to fix; just log on and then repeat the process as described.

**Error Message:** Out of memory.

**Solution:** When you exit a program but don't restart your computer, sometimes the program doesn't return its memory resources to the system. One way to use your memory as efficiently as possible is to reboot occasionally after closing down programs. Or, if you have multiple programs and/or multiple windows open within those programs, the programs may take up so much memory that there is nothing left over to open another program. Close open files, quit programs you aren't using, and reboot. Memory errors seem to be more of an issue for WinMe users.

**Error Message:** "MMSystem263. This is not a registered MCI device." or "MMSystem296. The file cannot be played on the specified MCI device."

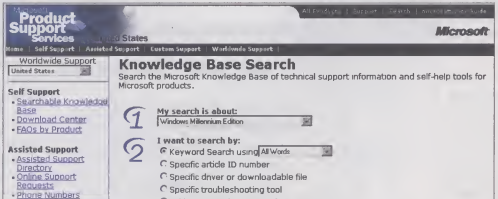
**Solution:** MCI (Multimedia Control Interface) is a Microsoft Windows API (application program interface) that allows one set of commands to control various multimedia hardware on your system. This makes it easy for programmers to build applications that take advantage of multimedia hardware, such as CD-ROM players and MP3 players. But if the media control device isn't turned on or properly installed, you may experience trouble with the devices. For more information about proper installation, see "Break Down Windows 98 & Me Barriers" and "Windows 98/Me Compatibility Issues" in this issue.

**Error Message:** MIDI output error detected.

**Solution:** Your sound card manufacturer is responsible for supporting the installation and MIDI (Musical Instrument Digital Interface) playback from within Windows (MIDI provides a protocol for transforming music into data and vice versa). So, if you see this message, the fault possibly lies in the way the sound card instructs your System.ini file.

Click the Start button, Search, and select For Files Or Folders. In the search field, type system.ini and click Search Now. In the results list, if you don't see Midi=mmsystem.dll and Wave=mmsystem.dll, check with the sound card manufacturer for help. If you do see the listings, try playing another WAV or MIDI file to see if perhaps it's a lone corrupt file.

**Error Message:** The initialization of the Help Center Failed. Please report the following error number to Microsoft Support: 2147024893.




**If you run into an error message and don't know what it means, look for answers at the Microsoft Knowledge Base site using the search tools it provides.**

**Solution:** When all else fails, turn to Microsoft Help And Support (by double-clicking the My Computer icon on your Desktop and selecting Help topics from the Help menu). Here, you're sure to find help with dozens of pesky error messages. But what if you can't open the Help center and see this error message on-screen instead? Don't panic. Instead, open an MS-DOS prompt and type the following, pressing ENTER after each line:

```
cd c:\windows\system
copy regsvr32.exe wbem
cd wbem
for %%f in (*.dll) do regsvr32 -s %%f
winmgmt /regserver
exit
```

Because Microsoft Help And Support is a feature of WinMe, this error message doesn't apply to Win98.

**Error Message:** Helpctr has caused an error in MSHTML.DLL. [CLOSE] Helpctr will now close. If you continue to experience problems, try restarting your computer.

**Solution:** Some users can't seem to properly launch Microsoft Help And Support, while other users can't seem to close it. If you have this problem, unfortunately, there isn't a lot you can do about it right now. Microsoft notes that its fix has not been fully tested and should only be applied to computers that run into this problem. Users are urged to contact Microsoft Product Support Services to obtain the fix (http://support.microsoft.com/directory/overview.asp).

**Error Message:** Fill in the blank.

**Solution:** No, this isn't the text of an error message; instead, it's a category of errors for which you can't find any documentation. When you come across such messages, Microsoft recommends you perform what is known as a "clean boot," a way of disabling common startup programs, settings, and drivers to troubleshoot issues in WinMe.

Implementing a clean boot often results in a temporary loss of some functionality, but it may isolate the annoying error message so you have more information about it. To perform a clean boot in WinMe, click the Start button, Run, type **msconfig**, and click OK. On the General tab, choose Selective Startup, and clear all the checkboxes. On the Startup tab, place a check mark in the *StateMgr checkbox, and click OK. Restart your computer, select Run again, and type **msconfig**. Are the checkboxes on the General tab still cleared? If so, select one item at a time under Selective Startup and restart the computer to see if the error appears again.

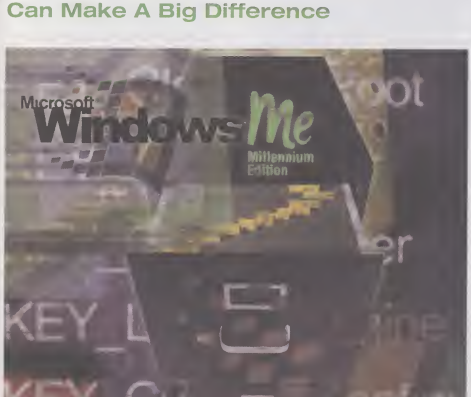
**Error Message:** When there are no blanks to fill in . . .

**Solution:** Finally, when your PC freezes, and you don't have an error message to explain why, try rebooting and running ScanDisk. Then, visit the Microsoft Knowledge Base (http://support.microsoft.com) and start searching its database for answers. LS

*by Heidi V. Anderson*

# The Windows 98 & Me Registry

## Little Changes Can Make A Big Difference




Microsoft's Windows OSes (operating systems), such as Windows 2000 and NT, are designed for business use and have always come with a variety of powerful tools that let administrators completely custom-tailor the software. Unfortunately, the company makes it difficult for home users with Windows 98 or Me to make similar changes. It has made it hard to view hidden system files, and although WinMe comes with more configuration options than any other home version of the Windows OS, there are still many things that can't be done via the graphical interface.

Fortunately, it's still possible to pop the hood, so to speak, and meddle directly with the Windows Registry to change advanced settings. The **Registry** is an important database where Windows stores information and settings pertaining to the hardware and software installed on your computer. When you print a document, for example, Windows looks to the Registry to figure out which printer is the default printing device. When Windows loads, it fetches your preferred monitor resolution from the Registry so everything appears exactly as you left it. There are thousands of these settings, all located in a central place. In fact, Microsoft introduced the Registry in Windows 95 to get away from the Windows 3.x procedure of storing system settings in dozens of separate and hard-to-track files.

The Registry actually consists of three files: User.dat, System.dat, and Policy.pol. User.dat contains all the personalized settings you have made along with password information. Things such as the icons that appear on the Desktop, your color scheme, screensaver settings, and other software-related preferences are stored in and drawn from User.dat. If you've used the Control Panel to enable User Profiles, many different users can create accounts on the same computer and have their settings retained and loaded each time they log in to Windows. It's possible, for example, to establish a business login that keeps all your business application icons and recently used work files on the Desktop, and a personal account that is customized for maximum gaming performance. You can also do things such as set up accounts for your kids that have much stricter Internet and other security parameters than your account. All these separate settings are stored in User.dat and loaded separately depending on the login information users supply.

The System.dat file contains all the hardware information for the computer, along with other settings that don't vary from user to user. Your sound card, printer, and other hardware devices all have the same Plug-and-Play settings regardless of the user who is using them. So, to avoid duplicating a lot of information by storing the same settings for each user in User.dat, they are all in System.dat. If you are using a network, each connected system has its own System.dat file, but the User.dat file could potentially be on a server. That way, any user of the network could log in to any machine, and it will automatically grab his preferences from the server and configure itself to match his User.dat settings.

The Policy.pol file is optional, and most home users who haven't enabled User Profiles won't find the file anywhere on their hard drives. It contains general policy settings that can override the settings contained in User.dat and System.dat. It is designed to give network administrators complete control over their network users, but parents, teachers, and anyone else using a network to limit children's computer privileges can use this file. You can set it up, for example, so your kids only have access to some games and can't access certain hard drives (such as those containing your important work files), or make it so Internet access is off-limits. Adults

logging in with their higher-level passwords could still get full-access privileges.

■ **Keys & Values.** Although two or three separate files form the Registry, it appears as one contiguous set of information when you open it for editing. This massive database is organized hierarchically, with six main root keys containing thousands of subkeys. Keys have associated data values and changing those values impacts the way Windows operates.

Create Shortcut
Type the location and name of the item you want to create a shortcut to. Or, search for the item by clicking Browse.
Command line:
mypath.exe
Browse...
Next >
Cancel

**This is what you should enter in the Create Shortcut box when you are making a Registry Editor shortcut to place on your Desktop for easy access.**

It's best to simply think of keys as folders and subfolders, and values as individual files contained in those folders. That's the way the Registry Editor (which we will discuss later) represents them. Values are where all the data resides. Every value in the Registry, regardless of its type (see below), has a name. So, there are three attributes to every value: its name, its type, and the (possibly empty) data associated with it. A key is a container. If you're thinking that it is a container for values, you're right, but that's only half the story. A key can contain both values and keys. The ability for a key to store other keys is what makes the Registry hierarchical. This permits keys to be nested within other keys to arbitrary depths.

To understand the Registry, think of Windows Explorer and how it holds files and folders. Keys, such as folders in Windows Explorer, can contain other keys, as well as data values. Just as your hard drive, probably the C: drive, has a WINDOWS folder that contains the Notepad.exe file, the root key HKEY_LOCAL_MACHINE has a subkey called Config, which holds a numbered subkey that in turn contains a Display key with a Settings subkey that opens various values related to your display when you click it. Windows also expresses the path for keys using the same format it used for folders. The full path for Notepad.exe is C:\WINDOWS\Notepad.exe. The path for the display settings key is HKEY_LOCAL_MACHINE\Config\0001\Display\Settings.

Three data types (values) are used to express values: Strings, binary entries, and DWORDs. (Technically, a DWORD is really a binary value with a fixed length of 32 bits or 4 bytes, so the academic society would argue for two flavors, but we won't quibble.) The value's flavor or type defines what kind of data can be associated with it.

Strings are what you'll work with most often, and they are contained in quotation marks. These let you enter text and standard numbers, which are put into a context when the value is grabbed from the Registry. For example, a string value of "10" could mean 10 milliseconds, 10 menu entries, or anything else depending on what key it is attached to. A string value consists of zero or more characters and digits. The name of the key will usually tip you off as to what the value data represents. A small icon that looks like a torn piece of paper with "ab" written on it always precedes string keys.

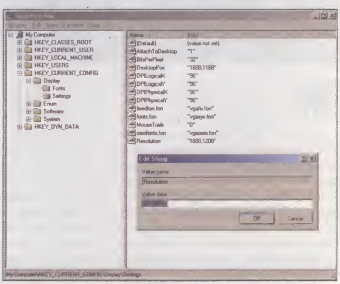
Binary entries and DWORDs are harder to understand because the values are expressed in binary and hexadecimal numbers that the computer can easily comprehend. A binary value represents its data in a form that is convenient for the system or a program to interpret. A DWORD value holds an integer, or in more technical terms, a natural number. Because a DWORD is stored in 32 bits, a DWORD's data can be as high as 4,294,967,295. Never adjust these values unless you have a specific replacement value ready to enter because it's difficult to remember what the original value was when expressions such as "f0 28 9a c2" are used.

■ **Registry Roots.** As mentioned, six root keys serve as the main Registry categories and contain all the other keys associated with your computer. Only three of the root keys are wholly unique—the rest are shortcuts that lead to frequently accessed and important sections of the main root keys.

**HKEY_CLASSES_ROOT.** The HKEY_CLASSES_ROOT root key merely serves as a shortcut to the important (and large) HKEY_LOCAL_MACHINE\Software\Classes subkey. The main purpose of this key is to store information for registered files types so Windows knows which programs are associated with each file type. When you have Microsoft Word installed and double-click a file with a .DOC extension, Windows consults HKEY_CLASSES_ROOT to determine that Word should be used to open the file. It's possible to add file types of your own creation to this key and associate them with applications installed on your computer. We'll discuss the process for doing so in detail in the section on editing the Registry.

**HKEY_CURRENT_USER.** The keys here contain the preferences, settings, and other values established by the user who is presently logged in to the computer. Desktop settings, mouse double-click rates, Favorites, and Recent Documents lists for the present user are all established by the data in HKEY_CURRENT_USER's subkeys. Things such as Control Panel settings, network information, and the default keyboard layout are in values found here. Like HKEY_CLASSES_ROOT, this root key simply acts as a shortcut to the individual user settings stored in another, larger root key; in this case, HKEY_USERS.

**HKEY_LOCAL_MACHINE.** One of the most important root keys in the Registry, HKEY_LOCAL_MACHINE is where all the




**Values in the Registry that you open for editing are labeled by their type. This is an open string.**

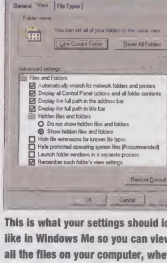
hardware and software configuration settings for your computer are stored. This is where device drivers, applications, and connected hardware, such as printers, joysticks, and video cards, all store and retrieve their settings. Security settings, startup and shutdown preferences, and selected power profiles are also stored here, among other things.

Note that just because software is installed on your system, its presence isn't necessarily noted in HKEY_LOCAL_MACHINE. Software has to actually add associated keys and values to the Registry before it is recognized, and some software, especially smaller applications, don't announce their presence to the Registry. Instead, they store all their configuration changes in their installation folders. Even software that is represented in the Registry can have a separate .INI (initialization) or other configuration file in its installation folder that grants access to advanced settings you can't adjust from the Registry. Check the documentation that came with your software to see if that's the case and refer to the ".INI Files: The Other Registry" sidebar to learn more about these important configuration files.

**HKEY_USERS.** This key stores settings, preferences, and security permissions for everyone with an account on the computer. It is where HKEY_CURRENT_USER draws its information from when a user logs in. If you have only one account on your computer, only a Default subkey will appear here, but separate keys represent multiple user profiles if you have enabled and implemented that option on your computer via the Users entry on the Control Panel.

**HKEY_CURRENT_CONFIG.** Yet another shortcut root key, HKEY_CURRENT_CONFIG, mirrors the data in the HKEY_LOCAL_MACHINE\Config \000x subkey. If you don't have multiple user profiles installed, the final key is 0001, but numbers such as 0002 and 0003 are added as you add more user accounts. HKEY_CURRENT_CONFIG mainly serves as a quick way to navigate to your display settings, printer keys, and a few other hardware keys that are best left alone.

**HKEY_DYN_DATA.** The contents of HKEY_DYN_DATA key are dynamically created and changed depending on the applications and hardware presently running on your computer. Unlike the other keys, which are stored on your hard drive and refreshed slowly, the contents of HKEY_DYN_DATA are stored in system memory where your system can modify and access them immediately. Beginners should not go near this key because




**This is what your settings should look like in Windows Me so you can view all the files on your computer, whether Microsoft tried to hide them or not.**

messing with settings that are updated dynamically can cause serious problems. Even experts who know what they are doing rarely have the need to adjust anything in HKEY_DYN_DATA, so you're not missing anything by leaving it alone.

■ **Get Started.** Most of the Registry files can cause serious trouble if you access them or edit them improperly. That is why Windows hides them by default. It's important to be able to see complete file names that include extensions (such as .TXT, .INI, or .EXE) and hidden files if you want to use any of the tips we provide below. If you can't see the extensions or can't find any of the files we mention in the locations we've noted, you'll need to make a few minor adjustments.

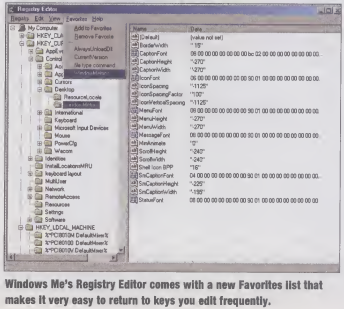
In Win98 or WinMe, open any folder on your computer and click Folder Options on the Tools menu. Choose the View tab.

Then, in WinMe check the Display The Full Path in Title Bar and Display the Full Path In The Address Bar boxes in the Files And Folders section. You also need to check the Display All Control Panel Options And All Folder Contents box. Choose the Show Hidden Files And Folders radio button in the Hidden Files And Folders section, and make sure the Hide File Extensions For Known File Types and Hide Protected Operating System Files boxes are clear (no checks). Click Apply and then the Like Current Folder button to make the changes affect all your folders. Click OK to finish.

In Win98, check the Display The Full Path In Title Bar in the Files And Folders section. In the Hidden Files section, click the Show All Files radio button. Then, below that, unclick the Hide File Extensions For Known File Types box. Click the Apply button then the Like Current Folder button. Click OK to finish.

■ **Backing Up & Restoring.** It is extremely important to make a backup of the Registry before making any manual changes to it, and it is a good idea to do so before installing applications that write new entries to it. The Registry is the heart of Windows, and if it doesn't work properly, you won't be able to use your computer at all.

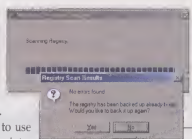
Windows automatically makes a backup copy of the Registry, and a program called Registry Checker, which runs automatically each time you boot the PC, checks for problems with your existing Registry files. If it finds a problem, Registry Checker automatically replaces the corrupt Registry with the backup copy. To manually make a fresh backup, launch the Registry Checker in Win98 or WinMe by clicking the Start button, Programs, Accessories, System Tools, and then System Information. Select Registry Checker from the Tools menu to


Registry Editor
Registry Edit View Favorites Help
My Computer
HKEY_CLASSES_ROOT
HKEY_CURRENT_USER
AppEvents
Control Panel
Accessibility
Appearance
Colors
Desktop
Resource.ocale
International
Keyboard
Microsoft Input Devices
Mouse
PowerCfg
Sound
Identities
InstallLocationsMRU
Keyboard Layout
MultiUser
Network
RemoteAccess
Resources
Settings
Software
HKEY_LOCAL_MACHINE
HKEY_USERS
Add to Favorites
Remove Favorite
Always Unload DLL
Current Version
Re-type command
Delete Subkey
Name
Data
(Default)
(value not set)
BorderWidth
"15"
CaptionFont
00 00 00 00 00 00 00 00 f4 ff ff ff 00 00 00 00 00 00 00

open the program, and it will scan the Registry and ask you if you would like to make a new backup. Click Yes and wait until the prompt appears to complete the process.

If you have a removable storage device such as a Zip drive or CD-R (CD-recordable) drive, you can manually back up the Registry files in case your hard drive fails. Open C:\WINDOWS and make a copy of System.dat and User.dat. In addition, open C:\WINDOWS\SYSBCKUP and copy the entire contents of that directory to your removable media. Those .CAB (cabinet) files contain the Registry backup Windows would use to restore the Registry in an emergency.

Typically, you will not need to manually restore a previously saved copy of the Registry because Registry Checker handles things automatically, but if worse comes to worse, the process is relatively easy. Click the Start button, select Run, and enter **scanregw /restore** in the Run box before clicking OK. It's a good idea to heed the warning that appears and close all open applications before proceeding with the restoration. The Restore System Registry dialog box that appears next contains a list of backups, so select the most recent date your computer was working properly and click OK.




**The Registry Checker automatically makes backups of the Registry, but you can launch it manually to create a completely fresh backup before you begin editing.**

WinMe users will also want to use the Registry backup tools that are integrated with its robust System Restore utility. Consult the help files that come with WinMe to learn more about this backup utility.

■ **Tweak UI.** Although the Registry is used to store settings pertaining to nearly every aspect of Windows and installed applications, be aware that many of the settings are accessible through graphical interfaces that are far easier to use than the Registry Editor. For example, HKEY_CURRENT_CONFIG has a Display folder with a Settings subfolder that contains the resolution and color-depth settings used by Windows. You can change the settings using the Registry Editor, but it's far more convenient to right-click the Desktop, click Properties, and use the slider bar and drop-down list on the Settings tab to apply the changes. Never use direct Registry changes unless it's absolutely necessary.

Before you dive in and start changing a bunch of Registry entries, you should really look at Microsoft's free Tweak UI utility for Win98 and Me. The company doesn't officially support the software because it doesn't work with all systems, but we've never had compatibility problems or encountered system instability that stemmed from using the software.

Tweak UI gives users the ability to make dozens of Registry changes using checkboxes

## .INI Files: The Other Registry

Microsoft didn't always organize Windows settings in one massive database. Before Windows 95 appeared, they were scattered everywhere in .INI (initialization) files. To maintain backwards compatibility with older software and hardware, the main .INI files are still in modern incarnations of Windows. In fact, many Registry entries contain references to files that end with the .INI extension, effectively telling Windows to look to those files for the default settings used by the program or hardware device in question.

These files are usually in the main installation directory that was created when you installed your hardware or software, although many are placed in the C:\WINDOWS or C:\WINDOWS/SYSTEM directories. A few are directly in the C:\ directory. The main ones used by Windows are Win.ini and System.ini. You can easily view the contents of these files by clicking the Start button, Programs, Accessories, System Tools, and then System Information. Click System Configuration Utility on the Tools menu to launch the application, and look at the System.ini and Win.ini tabs to see the contents of those two files. You can disable options by unchecking the boxes next to them, and use the New and Edit buttons to create new values or edit existing entries.

We don't recommend messing directly with .INI files unless you know exactly what you are doing. Look for files with names like Readme.txt, Read.me, or Readfirst.txt in the program's or hardware's installation directory and open them in Notepad or WordPad to look for references to editing the .INI files. In Windows 98, hold the SHIFT key and right-click the text document's icon to select Open With from the dialog box, then choose either Notepad or WordPad and be sure to select the Always Use This Program box before clicking OK. In Windows Me, just right-click the icon, expand Open With, and either select Notepad from the list or click Choose Program to get the full list. (You can access Notepad and WordPad in any version of Windows by clicking the Start button, Programs, Accessories, and the appropriate entry.)

Even though you can read Readme documents with any text editor, we recommend that you edit any .INI files you have only in Notepad. Notepad is a plain-text editor, and it won't attempt to apply fancy formatting to a document, spell check it, or save it in a different format. Even opening an .INI file in a complex text editor such as Microsoft Word can tamper with its formatting and make it unreadable by the program it is associated with. We also recommend making a copy of any .INI file you edit.

Many .INI entries use simple flags to adjust settings, where "1" or "Yes" means that function is enabled, and "0" or "No" means it is turned off. For example, the game Jane's WW2 Fighters has an .INI file that contains many options not available in the main game configuration screen, and most are controlled by changing a "Yes" to a "No" and vice versa. One of these is a now-infamous .MildLanguage setting that when enabled makes the speech of the in-game pilots a little more *colorful.* There are many such secret settings hidden in game and business application .INI files.

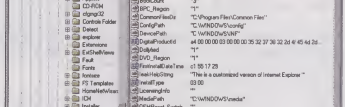
and other graphical interface tools instead of the archaic Registry Editor we'll soon discuss. It doesn't allow for some of the more exotic adjustments you can make with manual edits, but most of the important changes the majority of users long to make are included. There are mouse settings, a paranoia tab for deleting history and documents lists automatically, and tons of other options.

The latest version of the software works with both Win98 and WinMe, and you can download it from Microsoft's Web site at http://www.microsoft.com/ntworkstation/downloads/PowerToys/Networking/NTTweakUI.asp. Complete instructions for installing the small but powerful tool are on the download page. Once you install it, you can access the program by clicking the Start button, selecting Control Panel, and then double-clicking the Tweak UI entry.

■ **Get Your Bearings.** We'll be working with the Registry Editor included with Win98/Me. You can access by clicking the Start button, choosing Run, typing regedit, and clicking the OK button. It's also possible to quickly create a shortcut on your Desktop that you can use to access the Registry Editor with a simple double-click. Right-click an empty portion of the Desktop, expand the New entry, and click Shortcut. Type regedit.exe in the Command Line box, click Next, and type a label in the box (we used Registry Editor) before clicking Finish. The shortcut will appear, and Windows will automatically assign an icon to it.

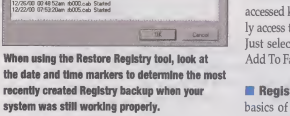
When the Registry Editor is open, you'll see a window with two panes, similar to Windows Explorer. The left pane contains the six root keys, which you can expand to display subkeys by clicking the plus symbol next to each. When you click a particular key on the left, all the data values in that key display on the right side of the window.

A large number of keys will read [Default] in the Name list and [value not set] in the Data list. That means they are using the default settings, which you will rarely need to modify. When there's an actual name listed, such as Resolution, and a concrete value, such as "1600,1200," it's likely you can modify the value to make a change. Some of the tips in this article and many you'll find on the Internet will require you to manually add keys. To accomplish this, right-click the key or subkey you want to add a subkey to and expand the New entry. Click the Key entry and type the name of the key you are creating. If you mess up, right-click the name of the key and click Rename.




**The Registry Editor shows root keys and subkeys on the left and keys with values associated with them on the right. Click a plus symbol to expand the list; click a minus symbol to collapse it.**

To add a value to a key, open the key by clicking it and right-click an empty portion of the right pane. Expand the New menu and click String Value, Binary Value, or DWORD Value depending on the instructions you were given. Most of the entries that are added to allow for manual adjustments are String Values.


Restore Registry
Select one of the following back-up copies of the registry to restore. It is recommended that you choose the most recent date on which your computer was working properly.
12/-20/00 01:54:10am dx002.cab Started
12/-21/00 02:54:04am dx003.cab Started
12/-22/00 03:54:02am dx004.cab Started
12/-23/00 07:53:28am dx005.cab Started
OK
Cancel

**When using the Restore Registry tool, look at the date and time markers to determine the most recently created Registry backup when your system was still working properly.**

To delete a key, right-click it and click Delete, or select it and choose Delete from the Edit menu. You also can select it and press the DELETE key. Don't be too hasty; the Registry Editor included with Windows is an extremely basic tool that doesn't come with an undo feature. Any changes you make are applied immediately, and the only way to restore things to their normal state is to import a saved Registry or retype the entry exactly as it was. Always write down the name of the key you are changing along with its original value. If you want, you can copy this data into a text file by highlighting the Value Name in the Edit String box, pressing CTRL-C to copy it, and then pasting it into your text document using Paste on the Edit menu or by pressing CTRL-V. You can use the same technique to copy the Value Data.

■ **WinMe vs Win98.** Microsoft has incorporated many settings that required making manual Registry changes in Win98 directly into the WinMe interface. A good example is the ability to set up the CONTROL PANEL, MY DOCUMENTS, MY PICTURES, and PRINTERS folders as cascading menus that operate like the submenus that snap open on the Start menu. Normally, these folders open in their own Window, and in Win98, making the change involves some complicated Registry editing.

In WinMe, you can establish those options by clicking the Start button, choosing Settings, clicking Taskbar And Start Menu, and selecting the Advanced tab. Checking the appropriate boxes on the scrollable list at the bottom of the tab and clicking Apply will establish the changes. There are a variety of little touches such as this in WinMe, and, where possible, we've focused on Registry changes that apply to both Win98 and WinMe.

The WinMe Registry Editor has a new Favorites menu that lets you add frequently accessed keys to a list. You can then immediately access the key by clicking its name on the list. Just select the key you want to add and click Add To Favorites on the Favorites menu.

■ **Registry Editing.** Now that you know the basics of the Registry Editor, it's time to put the utility to use. We've provided several examples of things you can accomplish with some quick Registry edits. Unless otherwise noted, you should leave the quotation marks off all the data you are asked to type.

**Changing the owner name.** Whether you bought a used computer from someone else or simply mistyped the information when you

were installing Windows, it isn't difficult to change the Registered Owner information that appears on the General tab when you right-click My Computer and select Properties. Go to HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion and scroll down the list of entries on the right until you see the RegisteredOwner key. Open it and enter any name you want. If it's a business computer, you can also open the adjacent RegisteredOrganization key and enter the name of your business.

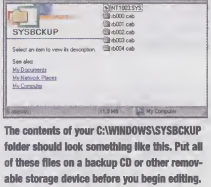
**Free processor "upgrade."** Got a buddy who has been bragging about his expensive new computer? There's an easy way to make him think your rig is just as modern. Find the HKEY_LOCAL_MACHINE\Hardware\Description\System\CentralProcessor\0 key and open the Identifier key. Now you can give yourself a Pentium 4, AMD Thunderbird Athlon, or anything else that strikes your fancy. You can change the Vendor Identifier key, as well. The information will reset itself when your computer reboots, so it shouldn't interfere with any data you submit to technical support representatives.

**Renaming the Recycle Bin.** The Recycle Bin is unlike other folders on your computer in that you can't easily rename it. You can use TweakUI to take care of this minor annoyance, but it's almost as easy to simply open the proper Registry entry and do it manually. Navigate to the key by opening HKEY_CLASSES_ROOT\CLSID\{645FF040-5081-101B-9F08-00AA002F954E}.

To change the name, double-click the (Default) entry to open the value for editing, and type whatever you want in the Value Data box. Click OK to change the name the next time you reboot your computer or refresh your Desktop. This happens automatically, or you can force the refresh by clicking the Desktop and pressing the F5 key.

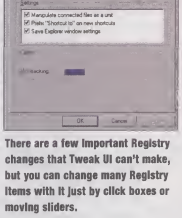
**Remove entries from Add/Remove Programs.** Unless you use a good third-party utility for uninstalling software, you've likely discovered that Windows does a poor job of cleaning up when you remove files from your computer using the standard Add/Remove Programs tool in the Control Panel. Frequently, removed applications leave behind a messy trail of near-empty folders and meaningless Registry entries, but perhaps the most annoying thing is when the application you've just deleted still appears on the Add/Remove Programs list.

It would take an entire article to document the process for ridding your system of all the detritus an uninstalled program leaves, but we can tell you how to get the ghost entries off the Add/Remove Programs list. Open HKEY_LOCAL_MACHINE\SOFWARE\Microsoft\Windows\CurrentVersion\Uninstall. All the keys that appear under Uninstall (on the left side of the window) represent programs that appear on the list. Clicking a key causes more detailed uninstall information to appear in the left pane, including the UninstallString key that shows where the program's uninstall program is located, and DisplayName, which shows the name of the application. Navigate to the directory listed in the UninstallString value data entry, and make sure Windows has properly uninstalled the program. If the program listed at the end of the value data entry (for example, Uninstal.exe, Uninstall.exe, or Uninst.exe) is there, double-click it to see if it removes the program and the corresponding entry from the Add/Remove Programs list. If the directory or uninstall file is not there, you can safely delete the application's subkey in the Uninstall list. Simply right-click the key's folder icon, click Delete, and the program's name will no longer appear in the Add/Remove list.




**The contents of your C:\WINDOWS\SYSBCKUP folder should look something like this. Put all of these files on a backup CD or other removable storage device before you begin editing.**

**Select a different Windows wallpaper directory.** If you've collected a lot of pictures in a directory and want to easily use them as Desktop wallpaper, you normally have to copy them to WinMe's default C:\WINDOWS\WEB\WALLPAPER directory. You can change this to your separate directory by opening HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows, clicking the CurrentVersion key and double-clicking the WallPaperDir entry in the right-hand pane. Enter the full path of your separate directory in the Value Data box (for instance, C:\My Wallpaper) and click OK. Now when you right-click the Desktop, click Properties, and browse wallpaper in the Background tab, the pictures will be taken from the directory you entered.




**There are a few Important Registry changes that Tweak UI can't make, but you can change many Registry items with it just by click boxes or moving sliders.**

**Find your Windows registration key.** Most copies of Windows come with the product registration key printed on the front of the manual or on the CD's case, and without that key there is no way to reinstall Windows if things go awry. If you can't find your key, navigate to HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows and click CurrentVersion. Look for the ProductId key in the right pane. The value in this data field is the key for your particular copy of Windows. Write it down and put it somewhere handy—you could tape it to the bottom of your keyboard.

**Find other registration keys.** Just as Windows keeps its own product registration key in the Registry, other programs store their keys there for easy reference. The trick is in culling the number you want from the myriad of other keys associated with each application. Open the list of installed applications in HKEY_LOCAL_MACHINE\SOFTWARE. Find the entry for the application you want the registration key or serial number for and expand its keys, clicking each one to see if any keys appear in the right pane. Look for keys with names such as SerialNumber, RegCode, SN, or similar contractions and write down the data that appears in the data value field. Few games store this information in the Registry, but it is included in the keys of most business applications. For example, the registration information for Microsoft Office is in HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft

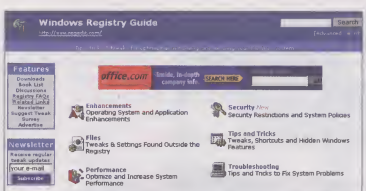
\Office\x.0\Registration \ProductID, where x.0 is the highest version number installed on your system (it will be 9.0 for Office 2000 users).

**Make cascading menus respond faster.** The animation for the cascading menus embedded in the Start menu or in application menus is easy enough to turn off, but making those windows appear more quickly when your mouse hovers over an entry is a little trickier. The value you are looking for is in HKEY_CURRENT_USER\Control Panel. Click Desktop in the left pane and look for a MenuShowDelay entry in the right pane. WinMe users likely won't see that entry, so if it isn't there, right-click in the right pane, expand New, and click String Value. Name the new key "MenuShowDelay."

Now you can open the key and change the value data. The number you enter is the time in milliseconds it will take for the cascading menus to expand. An entry of "1000," for example, means it will take one second for the menus to respond to a hovering mouse cursor. We set ours to a value between 50 and 100 to make the menus snap out as soon as the mouse cursor hits the parent entry.

**Use a certain program to open all unknown file types.** When Windows encounters a file with an extension it is unfamiliar with, it automatically launches the Open With dialog box to let you select an application to load the file into it for viewing or editing. Most users will want to leave things this way, but if you are in a position where the majority of the unknown extensions you encounter are text documents or pictures, you may want to set Windows up so it always uses a particular application to open the file. That way, you can double-click all the unregistered files and they will open normally in the program you specified, and if you get an unregistered file that isn't compatible with that application, you can right-click it and select Open With from the context menu to manually select a compatible application.

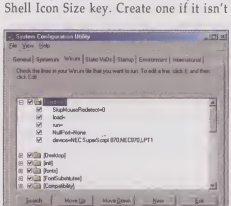
In WinMe, navigate to HKEY_CLASSES_ROOT\Unknown\shell\openas\command. Win98 users may have an "open" key instead of "openas," but otherwise the procedure is identical. Change the [Default] value so it contains the full path for the default application you want to use (C:\WINDOWS\Notepad.exe for Notepad, for example, or C:\WINDOWS\Kodakimg.exe if you want to use Windows Imaging to automatically open picture files).




**The Windows Registry Guide is a terrific place to find Registry tweaks and links to other Registry sites. Best of all, you can download its entire guide to your computer so you don't have to go online to use it.**

If you want to switch back to the Open With utility as the default software for opening unregistered file types, replace the value you entered with "C:\WINDOWS\rundll32.exe shell32.dll,OpenAs_RunDLL %1".

**Adjust icon sizes.** If you have many icons on your Desktop, you may want to make them bigger or smaller to better fit with the resolution you are running. Go to HKEY_CURRENT_USER\Control Panel\Desktop\WindowMetrics and open the Shell Icon Size key. Create one if it isn't present, as WinMe installations don't seem to have it. The default value is 32. Raising this value will make the icons larger; lowering it has the opposite effect. Be careful during your experiments because it is easy to crash your computer if you select a value higher than about 75. In addition, expanding the icons can cause text captions attached to them to overlap, and adjusting the icon size does not change the font size of the attached captions.




**The System Configuration Utility lets you view and edit the Win.ini and System.ini files using a graphical interface.**

**Change the default FAVORITES folder.** If you want to store your Favorites list somewhere other than the default FAVORITES folder, go to HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\User Shell Folders and open the Favorites key. Change the default value to the full path for your alternative folder, such as "C:\MY FAVORITES". Just be certain the folder actually exists before you establish it as the default FAVORITES folder.

■ **Third-Party Tools.** Many third-party tools will let you edit the Registry more easily or even apply changes automatically. One of the best automatic tools we've worked with is Xteq Systems' X-Setup, a freeware application that works like TweakUI, only with hundreds of more options. It also uses several wizards that let you choose what you want to accomplish and then guide you through the various necessary settings changes. You can download the software and various user-created plug-ins for it at the Xteq Systems Web site (http://www.xteq.com).

Registry Monitor from Sysinternals (http://www.sysinternals.com) is another freeware program, but this one monitors Registry changes in real-time so you can see exactly what programs or hardware devices are currently accessing the Registry. It can be an invaluable tool for tracking the source of system crashes, and you'll be surprised at how many programs access the Registry regularly even when their main components are not running.

There are also many Web sites that have Registry tips and tricks, as well as links to other Registry-related sites. Check RegEdit's Windows Registry Guide for hundreds of tweaks at http://www.regedit.com, along with links to a variety of other Windows customization sites. It is also possible to download a file containing all the tricks at the Web site that is viewable offline. LS

*by Tracy Baker*

# Solve Windows 95 Problems

## What To Do When Troubles Arise

When Windows 95 appeared, it represented a major improvement over its predecessor, Windows 3.1x. Friendly, accessible, and jam-packed with a host of new features, it was designed to maximize productivity, improve ease of use and provide click-on access to the Internet and to e-mail. Unfortunately, it also came with a few glitches. Here we offer a guide to troubleshooting the most common Win95 problems.

■ **Completely Uninstall Applications.** Use the Add/Remove Programs Control Panel to uninstall programs or selected program components from your hard drive. Access this Control Panel by clicking Start, Settings, Control Panel, and double-clicking Add/Remove Programs. Occasionally, when you uninstall a program with this Control Panel, or you try deleting a program by sending its files and folders to the Recycle Bin (rather than using the Add/Remove Programs Control Panel) its name may still remain on the Add/Remove Programs' Install/Uninstall list. To delete it from the Add/Remove Programs Control Panel list, use a Control Panel utility called TweakUI (User Interface). Included in a collection of PowerToy utilities enabling users to adjust their Windows interface, Tweak UI is available for downloading free of charge from Microsoft (http://www.Microsoft.com/NTWorkstation/downloads/PowerToys/Networking/NTweakUI.asp). (*NOTE: Use TweakUI with care. This is an unsupported tool, so Microsoft won't help you out if you run into problems. Back up first!*)

To download the application, create a new folder on your Windows Desktop. Right-click anywhere on the Desktop, select New, then click Folder. Type a name for the folder and Press Enter. Launch your browser, navigate to the Microsoft TweakUI download Web site, and Click the Download Now button. When the Save this program to disk option appears, click OK. Save the applet to the desktop folder you just created. After the program Saves to disk, double-click the Tweakui.exe icon to extract the files. Right-click the TweakUI.INF file, then select Install from the pop-up menu. When the installer asks for the installation disk, click OK, then navigate to the folder containing the extracted TweakUI files. Select the file the installer wants. Click OK. Once installed, exit the browser. Click the Start button, Settings, and Control Panel, then double-click TweakUI. Click the tab arrow at the top of the TweakUI Control Panel to scroll the list of tabs. Click the Add/Remove Tab and TweakUI displays a list of Windows applications that can be removed. Select the application you could not remove with Win95's Add/Remove Control Panel. Click Remove, Apply, then click OK.

■ **Startup Errors.** If after uninstalling an application your computer displays a message at Startup indicating it is unable to load or locate this application, it may be because a Windows system file is trying to load it into memory at Startup. To eliminate this error message, click the Start button, Run, and then enter SysEdit. Click OK. The System Configuration Editor loads. Click the title bar containing the WIN.INI file. In the [windows] section, you'll see two commands: load= and run=. Some applications load themselves into memory by using these commands. If either contains a single entry that is linked to the error message you see at Startup, place a semicolon (;) at the beginning of the line to prevent it from loading at Startup. Alternatively, delete it, taking care not to delete either the load= or run= commands themselves.

■ **Lost Filenames.** Win95 provides support for filenames containing more than eight characters, but the application that creates those files must also support long filenames. Applications that don't support long filenames will display short filenames. If you're using one of these particular applications (such as Save, Copy, or Move) to manage a file with a long filename, the longer filename will be lost.

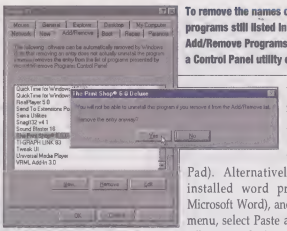
■ **Hardware Conflicts.** If a hardware installation fails, restart the computer and rerun the Add New Hardware Control Panel Wizard. It may take Win95 two or three tries to get the installation right. If your new device still isn't working properly after several attempts, run the Win95 Hardware Conflict Troubleshooter. Double-click Start, select Help, and click the Contents tab in the Help Topics window. In the topics list, double-click Troubleshooting and click If You Have A Hardware Conflict. In the Help box that appears, select Start The Hardware Conflict Troubleshooter. Follow the Troubleshooting applet's advice. If your problem isn't solved after running the Hardware Conflict Troubleshooter, you may need to get an updated hardware driver. Check the manufac-

turer's Web site for updated drivers or call the product's technical support desk.

■ **Modem Problems.** To install a new modem on a Win95 system, click Start, Settings, Control Panel, and double-click the Modems icon. Then click Add. The Install New Modem Wizard launches to detect your modem. Click Next and follow the on-screen instructions. If your modem isn't on the list of devices in the wizard, install the modem from the disk that came with it. If this doesn't work, use the Modem Wizard to select a similar modem model from the same manufacturer. If this also fails, try installing a Hayes-compatible or a Standard Modem Type device. The term Hayes-compatible simply means the modem supports the same set of dialing commands used by the original Hayes Smartmodem. For compatibility purposes almost all modem manufacturers build in support for the Hayes AT command set (called AT because virtually all commands in the set begin with the letters AT). Once your modem is up and running, visit the manufacturer's Web site and download the latest drivers. If problems persist and you can't access the site, contact the manufacturer directly for support.

If Win95 fails to select your modem model during setup, you can manually select one for it to install by clicking the Start button and selecting Settings. Click Control Panel and double-click Modems. Select Remove to delete the currently installed modem from your system. Click Add to launch the Install New Modem Wizard, then select Don't Detect My Modem; I Will Select It From A List. Click Next and select your modem's manufacturer from the list. If it isn't on the list, select an equivalent speed model from your modem manufacturer. If the manufacturer isn't on the list, select Standard Modem Types from the list. Scroll the list and select a Standard model with the same bps speed as your modem and click Next. Select the Port this modem will use. Typically, it's COM2 or COM4. Click Next, and Win95 installs the modem.

■ **Connect To The Internet.** Dial-up modems typically use a PPP (Point-to-Point Protocol) communications protocol to establish a dial-up connection to an ISP (Internet service provider). If you have trouble connecting to your ISP through a PPP dial-up account, try turning off IPX (Internetwork Packet Exchange) header compression. (IPX refers to a networking protocol used by Novell NetWare operating systems. Header refers to that portion of a data message containing the control information.) To turn off IPX header compression, go to the Start button, Settings, Control Panel, and double-click Network. Scroll the list of Network components, select Dial-Up Adapter, and click Properties. Click the Advanced tab. Click Use IPX header compression, then select No from the Value drop-down list. Click OK. Then click OK again. If prompted, insert the Win95 system CD and follow the on-screen instructions.



**To remove the names of uninstalled programs still listed in the Add/Remove Programs dialog box, use a Control Panel utility called TweakUI.**

■ **Printer Problems.** If you're experiencing printer problems and nothing seems to work, you may need to remove and reinstall the printer driver. Click the Start button, Settings, and choose Printers. Right-click the printer you want removed and click Delete on the pop-up menu. A printer dialog box appears asking if you're sure you want to delete all files associated with this printer. Click Yes. Win95 removes the printer and its driver.

To add a printer, click the Start button, Settings, and, Printers. Double-click the Add Printer icon to launch the Add Printer Wizard. Follow the instructions to reinstall the Win95 print driver for your printer. To correctly install the driver, you may have to insert the disc or diskette that came with your printer.

■ **File Print Order.** For those times when the printer is printing several files, and you need one printed right away, change the order in which files are printed. Double-click the Printer icon in the notification area of the Taskbar. This opens the print queue window showing you which files are waiting to be printed and the order in which they will print. Click-drag the icon of the file you want to print to the top of the queue. Release the mouse button.

■ **Help With Help.** Sometimes the type size for a printed Help file is too small for visual comfort. Unfortunately, while Win95 lets you change a Help file's font display size, it won't let you change the size of printed Help topics. If size is a problem, use the mouse to select the topic text you want to enlarge, right-click the text, and click Copy on the pop-up menu. This copies the selection to the Clipboard. Launch WordPad (click Start, point at Programs, point at Accessories, then click Word Pad). Alternatively, launch an installed word processor (e.g., Microsoft Word), and from the Edit menu, select Paste and click Select All, increase the font size, then print.

■ **Shared Resources.** The Network Neighborhood icon appears on the Desktop when a computer is configured for network use. Double-clicking this icon lets you locate and browse shared resources (e.g., files, folders, and printers) available on the network. If you find a resource, you can work with it in the same way as you would if it were installed on your computer. An X in the icon of a shared resource means it requires a new password for access or that it is unavailable.

■ **Disk Errors.** Computers process thousands of bits and bytes as they work. Over time errors are bound to occur, especially with files saved to disk. To minimize data loss, run the Win95 utility called ScanDisk at least once a week. Click Start, Programs, Accessories, System Tools, and then choose ScanDisk. The ScanDisk dialog box appears, asking you to select the drives you want to check for errors. Then choose the type of test you want to run. (Standard to check only files and folders; Thorough to look at the disk surface for errors in addition to file and folder errors). Check the Automatically Fix Errors option and click Start. If ScanDisk finds an error, it will ask you if you want to discard the fragment, convert the fragment into a file, or ignore the error and continue. If you're unsure about the importance of the data fragment, convert it to a file, and click OK. After completing its work, ScanDisk pops up a summary report of what it found.

■ **Find Missing Files.** If you want to retrieve a file saved to disk but haven't a clue where you saved it, use the Start menu's Find command. You must specify part of the file name or some text contained within the file for the search to be successful. Click Start, select Find, and click Files or Folders. The Find All Files dialog box

displays. Enter the name of the file as you remember it. If you're unsure about the name, just enter a portion of the name, such as "Let" for "letter," "letters," or "lettuce." Indicate where you want the Find applet to search. Entering C:\ directs Find to look only on the C: drive. Specifying My Computer broadens the search to include the Desktop and other drives. The wider the search option, the more thorough the results. Click Find Now to retrieve all matches, including duplicate names. Double-click the file you want to open.

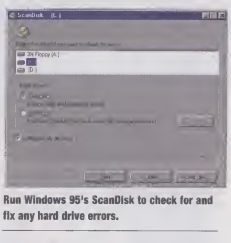
■ **Sound Advice.** All Win95 events from start-up to shutdown can be associated with a sound. You can direct Win95 to play a sound when there's a program error, a program launches, e-mail arrives, and more. Configuring the sound association takes place in the Sounds Control Panel (click the Start button, choose Settings, Control Panel, and double-click Sounds). There's a tiny speaker icon next to each event associated with a sound. Win95 has several preconfigured sound schemes that you can use. If sound scheme options don't appear in the Schemes drop-down list, you must install them. To do this, go back into the Control Panel and double-click the Add/Remove Programs option. Select the Windows Setup tab, choose Multimedia, Details, and click the Sound Schemes to install. Click OK, Apply, and click OK again. Win95 may prompt you to insert the system CD to complete installation.

■ **Missing Sound Icon.** If the Sound icon disappears from the Taskbar System Tray, click the Start button, Settings, control Panel; then double-click Multimedia Control Panel, click the Audio tab, and place a check mark in Show volume control on the Taskbar.

■ **Hidden Taskbar.** Occasionally you may work in a program window that covers the Taskbar, making it difficult to switch among open applications or to access the Start button. If you can't see the Taskbar, press and hold the ALT key as you press the TAB key to switch among open applications. Press TAB until the application you want is selected, then release both keys. To display the Start menu and the Taskbar at the same time, press CTRL-ESC.

■ **Can't Clear Paint Image?** The Paint application bundled with Win95 lets users create bitmap images, turn a picture into a Desktop background, modify existing graphics, and more. Access Paint by clicking the Start button, Programs, and Accessories. When working in Paint, the Clear Image command, (found in the Image menu), becomes unavailable if the Text tool is selected. To clear your electronic canvas, deselect the Text tool and click Clear Image.

■ **Formatting Troubles.** If Win95 refuses to format a disk in drive A:, it may be because a file on that disk is open or the disk itself is open in My Computer or Windows Explorer. Close any open windows, then format the disk.




**Run Windows 95's ScanDisk to check for and fix any hard drive errors.**

■ **Drag & Drop.** When copying information from one document to another using the technique of left-click drag and drop, information will disappear from the original document if you don't hold down the CTRL key while you drag and drop the selection. To complete the task, release the mouse button first, then the CTRL key. A plus sign (+) to the left of the box in the mouse pointer indicates you're "copying" rather than "moving" data.

■ **Opening Files.** If a file opens in the wrong program after you double-click its icon, you must change the program to which that file type is registered. Right-click the Start button, click Explore, and select Options from the View menu. Click the File Types tab and scroll the list of Registered file types to locate the problematic one. Click to select it then choose Edit. Select Open in the Actions window. Click Edit and select the Browse button to navigate to the application you'll need to open this program. Click OK and then Close.

■ **Outsmarting AutoPlay.** If the Win95 AutoPlay feature is turned on, Win95 will begin playing an audio CD as soon as you insert a CD in the disc drive. To prevent the CD from playing automatically without turning off AutoPlay, press and hold the SHIFT key when inserting a disc. To disable AutoPlay permanently, right-click Start, click Explore, then select Options from the View menu. Click the File Types tab. Scroll the list of Registered file types to locate AudioCD, click to select it, and then click Edit. Click the Set Default button. If the Play command in the Actions window is in boldface, AutoPlay is on. If Play is not bolded, AutoPlay is off. Click OK, Apply, and then Close.

■ **Desktop Fonts.** If your Desktop appearance needs sprucing up, change the typeface Win95 uses for particular items such as Caption buttons, Active Title Bar, and Icons. Right-click anywhere on the Desktop, select Properties, and click the Appearance tab. Select the Desktop element you want to change from the Item drop-down menu, choose a font from the Font drop-down list and select a type size. Click OK.

■ **Documents Menu.** Prevent others from easily viewing files you've recently worked on by clearing the contents of the Start menu's Documents sub-menu. Right-click a blank area of the Taskbar, select Properties, and click the Start Menu Programs tab. Click Clear.

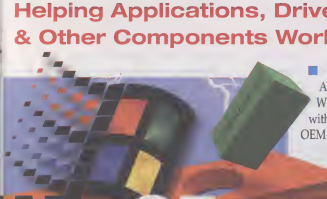
■ **Exiting Programs.** Occasionally when working in a program, it stops responding. You can move the cursor around the screen, but nothing happens when you click icons or pull-down menus. If you can't close the program window or exit the program, press CTRL-ALT-DEL. The Close Program dialog box will pop up with a list of all currently running applications. Most likely, there will be a "not responding" text message next to the name of the application that is no longer functioning properly. Click that program to select it, then click the End Task button to close the program. You can probably restart the application and continue working, however, it may be best to close all open applications and restart your computer to refresh the system.

■ **Banish The Win95 Blues.** No operating system is trouble-free. While Win95 gives users more control over installed files and folders, and a Plug-and-Play architecture that simplifies the installation and setup of new hardware, there will be times when you wish you had a direct line to technical support. Before making that call, be sure to read our self-help solutions to common Win95 problems. You'll spend less money on tech support and begin to master the intricacies of your computer's operating system. LS

*by Carol S. Holzberg, Ph.D.*

# Eliminate Compatibility Friction In Win95

## Helping Applications, Drivers & Other Components Work Together




When Windows 95 was released in August of 1995, it arrived with great fanfare. At the time, it was a significant leap forward from Windows 3.1 and Windows for Workgroups 3.11. But many years and many versions of Windows have since come down the pike, including several releases of Win95, Windows NT, a couple versions of Windows 98, and the most recent versions of Windows 2000 and Windows Me.

So, Microsoft is continuing to march forward as it releases new versions of Windows, but there are still many of you out there using perfectly good, early Pentium-class computers, and you are doing just fine—thank you very much—running Win95 on these machines.

After years of using this OS (operating system) and running your favorite software, you've probably encountered many compatibility issues, downloaded the necessary fixes, and kept humming along. No need to move on to Win98 when Win95 is working fine. At the same time, however, it's important that you realize that there are still problems lurking out there. This article explores how to deal with compatibility problems within Win95 when you encounter friction.

**Where Is Win95 Now?** Although the last release of Win95 was way back in 1997 with the release of what was called OEM Service Release 2 for Windows 95, Microsoft has continued to make small patches and fixes. You should check out the Win95 home page (http://www.microsoft.com/windows95) from time to time and see what's there. You'll find the latest information on Win95 (and even a pitch for you to upgrade to WinMe), along with access to any available downloads.

If your machine is running fine now, you may want to leave well enough alone and forego downloading the latest and greatest version of Microsoft Internet Explorer, but it's a good idea to take a peek at those Win95 security patches. These patches should help protect you from known Win95 security holes that leave your system vulnerable to viruses and other attacks.

**Check Before You Buy.** Just because you're using an older OS doesn't mean you'll never want to upgrade your hardware or software. Many of you might want to get a newer graphics card, a better sound card, a new game, or an updated software package. After all, why should you be left behind just because of your OS? You shouldn't be, and you don't have to be, just as long as you abide by some necessary precautions before you take out your credit card and sign on the dotted line.

Remember: Before you buy anything for your Win95 machine, make sure it's compatible with Win95. For hardware, that means making sure that there's a driver that works with Win95. The **driver** is the piece of software that allows your hardware (such as your new sound card) to communicate with the OS, and therefore, function correctly. For software, compatibility with Win95 simply means that the software has been designated as also working on Win95 machines.

In addition, investigate whether the product itself includes Win95 as a compatible OS. A lot of new upgrades to existing products aren't compatible with Win95.

For example, let's assume that you wanted to purchase Photoshop 6.0 for your Win95 machine. Go to Adobe's Web site (http://www.adobe.com) and click Products in the navigation bar to see a list of products. Click a link for Photoshop 6.0 to access its Web page. Select Product Info, then System Requirements to review what Adobe has to say about the OS requirements. Notice that it does *not* include Win95 in its list of compatible versions of Windows. Therefore, you can safely assume that Photoshop 6.0 won't work with your Win95 system.

To locate the most recent version that will work with Win95, use the Microsoft Compatibility search engine described below. (You'll find that Photoshop 4.0 was the last version that was compatible with Win95.)

**To Resolve Compatibility Issues.** Suppose you buy your product and still run into compatibility issues, despite the fact that it's listed as compatible with Win95. Just because the product is certified to work with Win95 does not necessarily mean that it's compatible with the rest of your hardware setup or with the other software currently installed on your system. OS compatibility is just one issue, but with the dizzying variety of hardware and software configurations available, problems can and do happen (as any Windows user is no doubt aware of and familiar with).

Begin at the manufacturer's Web site. You may not be the first person to encounter your problem and there may be a patch, update, or workaround available. (Later in this article, we list some known problems and solutions.)

Check a Win95 driver database such as the one on Frank Condron's World O'Windows site (http://www.worldowindows.com/win95.html). Review the driver information choices halfway down the page. You may be able to track down hard-to-find drivers here.

When all else fails, you can always call the product manufacturer's technical support phone number. Perhaps a customer support technician can point you toward a resolution to the problem over the telephone.

■ **Additional Help Resources.** If you need to track additional information, a good place to begin is the Microsoft Knowledge Base (http://search.support.microsoft.com/kb). This is the central support database for all Microsoft products, and it provides a user-friendly form for entering your search criteria.

Begin by selecting Windows 95 from the My Search Is About drop-down list. You'll need to scroll to the bottom of the list because it's a long alphabetical list of all Microsoft products. Next, select your search method. In most cases, the default choice is fine, but you can refine your search in this section by making different selections. Finally, type some keywords or a natural-language question, and then click Go.

Microsoft checks the Knowledge Base for any articles that match your query and returns a list of results. Scroll through the list of results and click the one that appears to match your search query the best. Once you click the result's link, you'll be able to display the corresponding article. Over the years, these articles have become more informative and often contain relevant details to help resolve known issues or links to sites where you can search for more information.

Microsoft's site also includes a Frequently Asked Questions & Highlights page (http://support.microsoft.com/directory/faqs.asp) where you can select product categories and review FAQs regarding Win95 problems.

For those of you who would rather check a source other than Microsoft, visit the Windows 95 Annoyances page (http://www.annoyances.org/win95). This resource provides a wealth of useful information, with a touch of humor thrown in for those of you who are, frankly, often annoyed while using Win95. (There's also a Windows 98 annoyances page should you decide to upgrade at some point in the future.)

The Windows 95 Annoyances page includes a list of hardware *not* compatible with Win95, as well as a page of patches, fixes, and workarounds. As an added bonus, it features a comical look at Win95 on a page called Windows 95 Annoyance Stories.

Finally, you can also try conducting a search for sites with information regarding your problem using an Internet search engine, such as Google (http://www.google.com), which seems to yield the best results for this type of search.

■ **Some Specific Issues.** This section lists some known problems concerning Win95 working with specific software and hardware products. Note that some of these involve older versions of software, but if you're using Win95, you may have these versions installed on your system.

### Products: AMD K6-2 or Athlon CPU and Windows 95 OEM Service Release (version 2)

**Problem:** While starting Win95, you get one of the following error messages:

"Device IOS failed to initialize. Windows Protection Error. You must reboot your computer."

"Windows Protection Error. You must reboot your computer."

"While initializing device IOS: Windows protection error."

**Solution:** Visit the Microsoft Windows Update page for Win95 (http://www.microsoft.com/windows95/downloads), scroll down to the Service Packs section, and then select the Win95 update for AMD K6-2/350. Read the instructions on the update page. Note that this patch is only for the OEM version of Win95 and will *not* work on the retail version of Win95. After reading the instructions in the Read Me First section, click the Download Now button at the top of the page.

**Date:** Last updated on July 7, 2000

### Product: Cirrus Logic PD 6832 Card Bus Controller

**Problem:** Audio output may be distorted or inaudible when starting Win95 or transferring files.

**Solution:** Again, visit the Microsoft Windows Update page for Win95, scroll down to the Service Packs section, and then select Windows 95 OEM SR2 Update For Proper Plug And Play Operation With Multifunction CardBus Cards. Read the information on the update page. Note that this download fixes a similar problem with several other card bus products. Follow the article links if you are having similar problems with a different manufacturer's product. Read the instructions in the Read Me First section, and pay particular attention to the required version of Win95 (see the "What Version Of Windows 95 Do You Have?" sidebar in this article) before clicking the Download Now button at the top of the page.

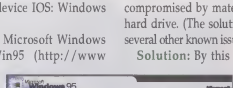
**Date:** Last updated on Aug. 14, 1999

### Products: Microsoft Office 95 applications

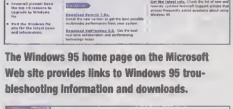
**Problem:** There are several problems related to OLE (object linking and embedding), including a security problem when using OLE in Office 95 (version 7.0) software, such as Word, Excel, and PowerPoint, where privacy could be compromised by material left behind on the hard drive. (The solution below also resolves several other known issues with OLE.)

**Solution:** By this time, you've probably bookmarked the Microsoft Windows Update page for Win95. Scroll down to the Service Packs section, and select Windows 95 OLE 32 Update. Read the instructions in the Read Me First section, and pay particular attention to the required version of Win95 (again, see the "What Version Of Windows 95 Do You Have?" sidebar) before clicking the Download Now button at the top of the page.

**Date:** Last updated on Aug. 19, 1999




**The Windows 95 home page on the Microsoft Web site provides links to Windows 95 troubleshooting information and downloads.**




**You will find a driver database with more than 800 Windows 95 drivers at Frank Condron's World O'Windows site.**

### Products: Microsoft Works 99, Studio Greetings 99, and other third-party software

**Problem:** These products use the runtime version of certain files shipped with programs created with Visual Studio 6.0 and copy DLL (dynamic-link library) files that may generate errors on machines running Win95.

**Solution:** According to Microsoft's Windows Update page for Win95, its update resolves a problem that causes some third-party software to crash because of "incompatibility

between Microsoft applications and third-party software." Microsoft recommends that all Win95 users download this update. To do so, visit Win95's Windows Update page, scroll down to the Service Packs section, and then select Windows Library Update. Read the instructions in the Read Me First section, and then click the Download Now button at the top of the page.

**Date:** Last updated on Feb. 16, 2000

### Products: Hewlett-Packard LaserJet Series 4 and Series 5 printers

**Problem:** Your system receives frequent "timeout" errors when printing and fails to take advantage of bi-directional communications that let the printer communicate and share information between the printer and your computer, such as when it is out of paper or there is a paper jam. This type of communication allows you to see a specific printer issue, rather than a generic printer problem message that may require some searching on your part to resolve.

**Solution:** You need to update the Lpt.vxd file by going to the Microsoft Windows Update page for Win95. Scroll down to the Service Packs section, then select Windows 95 Service Pack 1. Read the instructions in the Read Me First section, pay particular attention to the required version of Win95 for this fix, and then click the Download Now button at the top of the page.

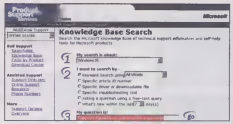
**Date:** Last updated on Aug. 1, 2000

### Product: Novell Netware

**Problem:** Your system can't browse Netware Directory Service printers when using the Add Printer Wizard.

**Solution:** You need to update the Shell32.dll file. Visit the Microsoft Windows Update page for Win95, scroll down to the Service Packs section, and then select Windows 95 Service Pack 1. Read the instructions in the Read Me First section, pay particular attention to the required version of Win95 for this update, and then click the Download Now button at the top of the page.

**Date:** Last updated on Aug. 1, 2000

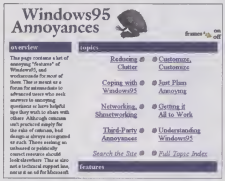

Product Support
Knowledge Base Search
Search the Microsoft Knowledge Base of technical support information and self-help tools for Microsoft products

**Search the Microsoft Knowledge Base for a wealth of information about Windows 95.**

### Product: Windows 95 Backup

**Problem:** Backup runs slowly. (The solution below also corrects a related problem and guards against erasing something by accident by disabling the Erase Tape command when backing up to a diskette or your hard drive.)

**Solution:** Download the Windows 95 Backup Update from the Microsoft Windows Update page for Win95. Scroll down to the Service Packs section, then select Windows 95 Backup Update. Read the instructions in the Read Me First section, pay particular attention to the required version of Win95, and then click the Download Now button at the top of the page.




**The Windows 95 Annoyances page offers serious fixes in a humorous setting.**

**Date:** Last updated on March 28, 1999

### Products: Microsoft Outlook 97/98 (using Lotus cc:Mail)

**Problem:** You need to support Lotus cc:Mail using Microsoft Outlook 97/98 while running Win95.

**Solution:** Download a special program developed for Microsoft by Transend by visiting a designated page on the Microsoft Office Update Web site (http://officeupdate.microsoft.com/downloadDetails/ccmailsp.htm). Read the explanation and follow the instructions listed here.

**Date:** Last updated on June 1, 1998

### Product: Microsoft Visual Studio 97 (service pack 3)

**Problem:** Addresses several issues related to this product, including a problem that makes Win95 systems unable to save files to a Web server from the FrontPage editor under the Visual InterDev program.

**Solution:** Download Service Pack 3 from a specified page of the Microsoft Visual Studio site (http://msdn.microsoft.com/vstudio/sp/vs97/download.asp) or upgrade to Visual Studio 6.0.

**Date:** Last updated on June 14, 2000

### Products: Microsoft Office 2000 (or individual products such as Word, Excel, etc.)

**Problem:** Your system has trouble with the installation CD-ROM when installing Office 2000 or its individual applications while running Win95.

**Solution:** There are a number of solutions listed in the Microsoft Knowledge Base article "OFF2000: Troubleshooting Installation From Compact Disc Media," including several workarounds for Win95 users. Visit this specified article page on the Knowledge Base (http://support.microsoft.com/support/kb/articles/q245/2/26.asp), and review the possible solutions. When you decide which solution applies to your situation, follow its directions.

**Date:** Last reviewed on Dec. 5, 2000

### Product: Seagate hard drive (no specific model given)

**Problem:** Your Win95 system reports it is running in MS-DOS compatibility mode.

**Solution:** Seagate claims that Win95 includes all the necessary drivers for a Seagate

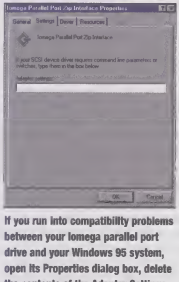
## What Version Of Windows 95 Do You Have?

Many of the updates and fixes outlined in this article require that you have a specific version of Windows 95 on your machine, such as OEM Service Release 2. To determine your version of Win95, click the Start button, Settings, and Control Panel. Double-click the System icon and the System Properties dialog box opens. On the General tab, check for your Win95 version number below the System heading.

**Check the General tab in the System Properties dialog box for your version of Windows 95.**

hard drive to run in 32-bit mode, so this means that some other driver is causing a conflict. According to information on Seagate's Web site, this could be due to a Win3.1 32-bit driver or a non-Win95 compatible driver for an IDE (Integrated Drive Electronics), ATA (Advanced Technology Attachment), SCSI (Small Computer System Interface), or another type of peripheral. You will need to track down this incompatible driver by following the instructions at the MS-DOS Compatibility Mode In Windows 95 page on the Seagate site (http://www.seagate.com/support/kb/disc/win95dos.html).

**Date:** Unavailable




**If you run into compatibility problems between your Iomega parallel port drive and your Windows 95 system, open its Properties dialog box, delete the contents of the Adapter Settings field, and then click OK. See our reference to the problem in this article for more specific details.**

### Product: Gateway computer (no specific model given)

**Problem:** You are having problems running your favorite DOS games on your Gateway computer.

**Solution:** Download the file Regfiles.exe from Gateway's Windows 95 page (http://www.gateway.com/gw%5Fatwork/support/product/drivers/software/win95.shtml). This program will help configure your system to allow you to play DOS games while running Win95 on your Gateway system.

**Date:** Last updated on January 1997

### Product: Macromedia FreeHand 8

**Problem:** Your Win95 system prints slowly.

**Solution:** Macromedia reports that users who have upgraded from an earlier version of FreeHand have reported slow printing on their Win95 systems. According to Macromedia's support Web site, this is due to the fact that FreeHand now uses a 32-bit print driver with version 8. As a result, a bug was encountered on Win95 systems. To resolve this issue, upgrade to a more recent version of FreeHand (be sure it works with Win95) or download the 8.01 version from the Macromedia site (http://www.macromedia.com). To locate the FreeHand 8.01 version, click Products on the Macromedia home page, find the Search field on the bottom of the page, type **FreeHand 8.01** in the field, and click Go. From the list of search results, click the Macromedia FreeHand 8.0.1b ReadMe And Instructions link, and look at the directions in the Windows section.

**Date:** Last updated on March 23, 1999

### Product: Macromedia Director 6.0

**Problem:** Launching Director 6.0 in Win95 triggers a GPF (general protection fault) error in module Dirmmx.x32.

**Solution:** Macromedia reports that the Director 6.0 installer includes an "Xtra" that enables MMX technology for Intel and AMD processors that support MMX, which is a set of multimedia instructions built into these CPUs beginning in 1997. Simply delete MMX Xtra from the XTRAS subdirectory (found under the DIRECTOR 6 directory), and the program should launch without this error.

**Date:** Last updated on Sept. 12, 1997

### Product: Iomega parallel port drive

**Problem:** Your computer locks up or reports a fatal exception error when running the Parallel Port accelerator software on Win95 (and Win98) systems. It could result in a lock-up or cause a blue screen to appear. (This is sometimes called "The Blue Screen of Death.")

**Solution:** According to the Iomega Web site (http://www.iomega.com), if this happens, disconnect your parallel port drive from your computer, and then restart it. Click the Start button, Settings, Control Panel, and double-click the System icon. When the System Properties dialog box opens, select the Device Manager tab, click the plus sign (+) next to SCSI controllers, and double-click Iomega Parallel Port Interface. The Parallel Port Interface Properties dialog opens. Click the Setting tab, and then delete all of the information in the Adapter Settings field. Click OK. Click No to the prompt to restart; instead, shut down the computer, reconnect the parallel port drive, and then restart your system.

**Date:** Last updated on April 7, 2000

### Product: Adobe PageMaker 6.0

**Problem:** While trying to print, you see an error message on-screen stating that you have mismatched printer and display fonts.

**Solution:** Try printing using the Adobe PostScript 4.1, which is included in the PageMaker 6.01 Enhancement Pack. If this doesn't work, see a specified Adobe support page (http://www.adobe.com/support/techdocs/aa8a.htm), and review other strategies for solving this problem.

**Date:** Last updated on March 28, 1996

### Products: Adobe Type Manager (ATM) 4.0 and Quarterdeck/Symantec QEMM 8.0 (or earlier)

**Problem:** Opening Adobe Type Manager causes Win95 to restart or freeze while running QEMM 8.0 (or earlier).

**Solution:** Because QEMM is a discontinued product and no upgrades are available (see http://www.symantec.com/techsupp/qemm/discontinued_qemm.html), you must disable it altogether. To do this, you need to replace QEMM with the Windows memory manager: Himem.sys. Make sure you create a backup of your Config.sys file (usually found in the root directory of your hard drive) and give it an extension of .OLD (or any extension you want).

Search for a copy of Himem.sys on your system by conducting a search from Windows Explorer (accessed by clicking the Start button, Programs, and Windows Explorer). If you find more than one version, right-click and select Properties to determine which file has the most recent date, and then make a note of the full path to the most recent one.

Next click the Start button, Run, type **sysedit**, and click OK. Click the Config.sys title bar, locate the line Device=QEMM386, and type the letters **REM** in front of the line, so it now reads:

REM Device=QEMM386

Press ENTER, and at the new line, type **device=c:*windows*\himem.sys** (replace this path with the correct path to the most recent Himem.sys file, as you noted earlier). Click File, select Save, and then restart your computer.

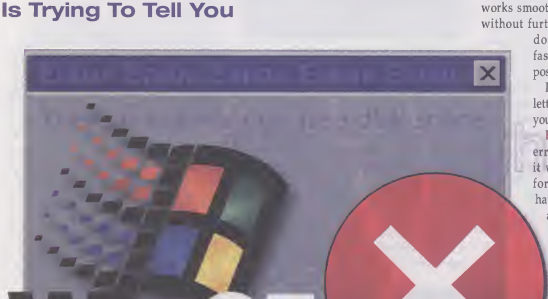
**Date:** Last updated on May 15, 1998

■ **Win95 Marches Forward.** As Win95 gets older, there are fewer new problems to encounter, although the problem may be new to you. The good news is that there's probably information about the problem out there by now. If you encounter compatibility difficulties, just take the time to do a little research. Chances are, you'll find a solution fairly quickly. LS

*by Ron Miller*

# Interpret Win95 Error Messages

## Find Out What Your Operating System Is Trying To Tell You




Windows 95 has been around for a very long time, and you are not likely to encounter any error messages you haven't seen before. Yet, Win95 has a bad reputation for displaying operating system error messages, which can at best be described as cryptic. While this is not always true (sometimes Win95 error messages are quite clear), the messages rarely give you any information about what you should actually do about the error.

An error message with a link to a Help file would be nice, but unfortunately, no such link exists. So, your best bet at this point in the evolution of Win95 is to upgrade to a newer version of Windows (98 or Me), or read this article and try to understand what these error messages mean and what you can do about them. If you want to treat Microsoft's lack of information with a sense of humor, see LinkScan's Complete List of Windows 95 Error Messages (http://www.elsop.com/wrc/humor/ms_winer.htm). This provides a list of fictional error messages and humorous results. For those of you who have to deal with real error messages, however, read on.

Since Win95 has been around since, well, 1995, there are probably not a lot of you who are installing Windows from scratch. Therefore, this article will skip installation issues and concentrate on the types of errors you are likely to see on a day-to-day basis.

**Error Message:** Windows was not properly shut down. One or more of your disk drives may have errors on it. Press any key to run ScanDisk on these drives.

**Reason:** You probably shut down Win95 without going through the normal shutdown procedure, which is to click Start, Shut Down, and select Shut Down again from the dialog box. When you shut down in this fashion, Win95 shuts down in a smooth and orderly manner. If you don't do this and just flick the switch off (or are forced to shut down because of a system lockup), you will get this error when you restart.

**Solution:** As the error message clearly instructs, press any key and Win95 runs the DOS version of ScanDisk to check the hard drive for errors. During this process, ScanDisk may find lost **chains** (refers to when your system writes data to your hard drive in a chain of clusters scattered over the drive), corrupted files, and other issues which this utility will fix. In most cases, this works smoothly and Windows then opens without further issue. Remember to shut down Windows in the proper fashion in the future (whenever possible) to avoid this problem.

If you cancel ScanDisk without letting it check all of your drives, you will encounter the next error.

**Error Message:** There was an error running Scandisk.exe, or it was canceled. Run ScanDisk for Windows as you may still have errors on your disk(s). Press any key to continue starting Windows.

**Reason:** During the previous situation (when Win95 was not properly shut down), you closed ScanDisk before it was finished checking your hard drive.

**Solution:** After Win95 opens, click Start, Programs, Accessories, and then ScanDisk to run the Windows version of the hard drive utility. Leave the defaults and click Start. Windows checks the hard drive for errors, automatically corrects any problems, and displays the results in the ScanDisk Results dialog box. Click Close twice to exit ScanDisk. You can now be fairly confident that any problems resulting from your improper shutdown have been resolved.

**Error Message:** You get an error message regarding a resource conflict when you attempt to install a plug-and-play adapter card.

**Reason:** While there are a number of possibilities, the most likely reason this error occurs is because there is an IRQ (interrupt request lines) conflict, meaning that a legacy device already installed on your machine uses the same IRQ that your plug-and-play device wants to use.

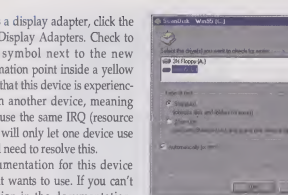
**Solution:** Right-click the My Computer icon and select Properties. Click the Device Manager tab and the plus sign (+) next to the line for the type of adapter you are installing.

For example, if it's a display adapter, click the plus sign next to Display Adapters. Check to see if there is a symbol next to the new adapter. An exclamation point inside a yellow circle is a warning that this device is experiencing a conflict with another device, meaning they are trying to use the same IRQ (resource setting). Windows will only let one device use an IRQ, so you will need to resolve this.

Check the documentation for this device and find the IRQ it wants to use. If you can't find this information in the documentation, then check the manufacturer's Web site or call customer support.

When you know the conflicting IRQ number, scroll to the top of the Device Manager and double-click the Computer icon. The Computer Properties dialog box opens with a list of devices on your computer and the IRQ assigned to each one. Scroll through this list, locate the device that is conflicting with your new device, and make a note of its IRQ. While you're at it, find an open IRQ and make a note of it. You'll need to assign the legacy device to the open IRQ.

Close the Computer Properties dialog box to return to the Device Manager, and then scroll through the list of hardware to locate the conflicting legacy device. Click the line for that device, then click Properties. Click the Resources tab, then uncheck Use Automatic Settings. Click the Interrupt Request line, click the Change Setting button, and assign the device to the open IRQ you noted earlier. This frees up the old IRQ for your new device. Click OK.

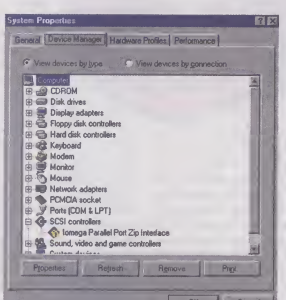


**If you shut down Windows 95 improperly, ScanDisk runs when you restart your computer.**

Return to the Device Manager, and click the line for your new adapter card. Click Properties and the Resources tab, and uncheck Use Automatic Settings. Next, click the Interrupt Request line, click Change Setting, and assign this device to the appropriate IRQ. Click OK.

Exit the Device Manager, restart Win95, and your new adapter and old adapter should now work. If not, you may need to contact the device manufacturer for technical support or contact an IT professional for assistance.

**Error Message:** You attempt to play an AVI file (**audiovisual interleaving**; a type of movie file), and Win95 displays a message indicating that it cannot play the file.




**You can check the Device Manager to find hardware conflicts and check IRQ (interrupt request lines) settings.**

**Reason:** You are probably missing a key program called codec (compressor/decompressor; used to compress and decompress data, which different technologies perform in different ways) that lets you play these types of files in Win95.

**Solution:** Click Start, Settings, and select Control Panel. In the Control Panel, select Add/Remove Programs. Click the Windows Setup tab, scroll through the list, and click Multimedia. Click the Details button, then scroll through the list, and select Video Compression. Click OK, and Win95 prompts you to insert the Win95 installation CD-ROM. Click OK to all prompts, and Win95 installs the components.

If you want to play a third-party movie format, you will need to install the codec specifically used with the given format. You should be able to find this on the given manufacturer's Web site.

**Error Message:** You get a "General Protection Fault" error while running a program.

**Reason:** This could be caused by any number of sources, but a program has likely performed some sort of illegal operation that either Win95 or the processor does not like.

**Solution:** If the computer allows, press any key to try to return to Win95. The offending program will probably close, but at the very least, you may be able to properly shut down other open programs. If the machine is completely locked up, press CTRL-ALT-DELETE to click End Task and close the problem program (while saving your work in the open programs), or if necessary, reboot the computer. If this doesn't work, you will need to press your computer's reset or on/off button. Note that if you do this, you will get the error message referenced earlier that Windows was not properly shut down.

**Error Message:** You get an error that a specified path is invalid when trying to run a shortcut.

**Reason:** This could be for several reasons: the file has been moved, you are attempting to run a 16-bit Windows 3.1 application under Win95 and the proper files are not installed, or you are victim of a known Win95 bug that does not allow spaces in the path name of a shortcut path.

**Solution:** Begin by checking the shortcut itself. Right-click the shortcut and select Properties. Click the Shortcut tab and make sure the program and path are correct, paying particular attention to whether there are any spaces in the parent folder name.

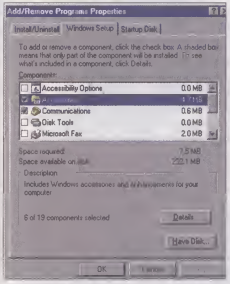
If the file was moved, enter the correct path name. On the other hand, if the path appears to be correct, you may be experiencing a conflict with a legacy Win3.1 application and need to update to a Win95 version of the software.

If the parent folder path name has spaces in it, this could also cause an error. Despite the fact that such a name is valid in Win95, there is a bug that causes this problem. You could try downloading a service release from Microsoft to see if this resolves the problem, or you could simply rename the offending directory so that it does not include any spaces by substituting

underscores for spaces. To do this, open Windows Explorer and locate the offending directory name. Right-click the name and select Rename, then give the folder another name that does not include spaces.

**Error Message:** When printing, you get an error indicating that there is not enough memory to render the page.

**Reason:** The printer driver has not calculated the printer memory correctly.


Add/Remove Programs Properties
Install/Uninstall
Windows Setup
Startup Disk
To add or remove a component, click the check box. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.
Components:
Accessibility Options 0.0 MB
Communications 0.6 MB
Disk Tools 0.0 MB
Microsoft Fax 2.0 MB
Space required: 1.3 MB
Space available on disk: 222.1 MB
Description
Includes Windows accessories and enhancements for your computer
6 of 19 components selected
Details...
Have Disk...
OK
Cancel

**To install a Windows 95 utility, access the Windows Setup tab in the Add/Remove Programs Properties dialog box.**

**Solution:** You can fix this problem easily by clicking Start, selecting Settings, then Printers. In the Printers folder, right-click the icon for the offending printer and select Properties. Select the Device Options tab, click Restore Defaults, and click OK to exit. Try printing again and the printer should be able to render the page correctly this time.

**Error Message:** You try to print a document, but Win95 displays an error message stating there is some sort of problem communicating with the printer.

**Reason:** Here, the exact reason is not immediately apparent, so you'll have to do some troubleshooting to determine the source.

**Solution:** Begin with the obvious. Is your printer turned on? Next, make sure the printer is connected to your computer properly. If this is in order, check your printer's properties and make sure they are configured according to the settings recommended by the printer manufacturer. To view printer properties, click Start, then Settings, and choose Printers. Right-click the printer with the problem and select Properties. Check your printer documentation or the manufacturer's Web site and make sure printer is configured correctly. While you're there, make sure you have the most recent version of the printer driver. Outdated or faulty drivers can cause some printer problems.

At this point, there are many possibilities, and your best bet is to run the Win95 Print Troubleshooter to try and isolate the problem. Click Start, then Help, and the Win95 Help window opens. In the Contents tab, double-click Troubleshooting, and then double-click the If You Have Trouble Printing topic at the top of the list. The troubleshooter offers three possibilities to get you started. Click one, and based on this choice, the troubleshooter asks additional questions until, by answering questions, you isolate the problem to the extent that the Troubleshooter can offer a possible solution.

**Error Message:** You receive an "Out of Memory" error.

**Reason:** You have too many programs open and not enough memory to handle it.

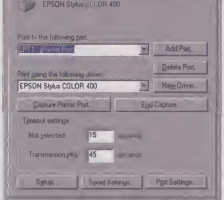
**Solution:** You need to shut down some programs. Note that this often doesn't give your system all of the memory back, but it may give you enough to shut down the computer and start again. After you restart your computer, you may want to check on the status of your resources before you begin opening programs. You can review the Performance status of your computer in a number of ways.

The easiest way is to right-click the My Computer icon on your Desktop and select Properties. Click the Performance tab and view how many system resources you have available. This needs to be greater than 20% or you are at risk of an imminent system crash. At startup, it should be more likely in the 70% or 80% range.

If you find that you have a lower than expected resource level at startup, and you haven't opened any programs, you may have a large number of programs in your STARTUP folder. These programs start automatically whenever you start Win95 and may be using up your system resources without your knowledge.

To remove items from your STARTUP folder, right-click an open area in your Win95 Taskbar and select Properties. The Taskbar Properties dialog box opens. Click the Start Menu Programs tab and then click the Remove button. Scroll through the list of programs until you locate the STARTUP folder. Click the plus sign (+) next to it to reveal all the programs that open automatically at startup. You may be surprised by how many programs actually open. Review this list. If you wish to remove any programs, click the desired program, then click the Remove button. When you are finished, click Close to exit, and then click OK to exit the Taskbar Properties dialog box.

Another option is to install the Windows Resource Meter from your Win95 CD-ROM. This application, when running, also uses some resources, but by monitoring your system as you open applications, you can identify which application is draining your resources. This utility does not install automatically with Win95, so if you want to install it, click Start, Settings, Control Panel, and double-click Add/Remove Programs. Then, click the Windows Setup tab, the Accessories line, the Details button, scroll to the bottom of the list, and select System Resource Meter.

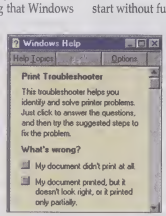



**Using the various options available in the Printer Properties dialog box can help solve some printer problems.**

Click OK twice, and Win95 prompts you to insert the Win95 CD-ROM. Insert the disc, then follow the on-screen prompts to install the utility. Once it is installed, click Start, Programs, Accessories, System Tools, and Resource Meter. Windows displays a dialog box indicating that this utility itself uses resources. Click OK to continue and Resource Meter opens and appears as an icon in your System Tray. You can run your mouse pointer over it to see how many resources are available, and then continue to check it as you open

programs to monitor which ones seem to be hogging resources.

**Error Message:** At startup, you get a message regarding a bad or missing VXD (virtual device driver) or 386 file stating that Windows has found a reference to this file in your System.ini or your Registry, yet cannot find any such file on your system. It prompts you to press any key to continue. While pressing any key usually allows you to start Win95, this message is particularly vexing because it states that this is the result of a program that was improperly removed and requests that you reinstall the program. Of course, it doesn't provide any information as to what the program is. You are left puzzled as you try to figure this out. In the worst-case scenario of this type of error, you can't start Win95 at all.


Windows Help
Help Topics
Options
Print Troubleshooter
This troubleshooter helps you identify and solve printer problems. Just click to answer the questions, and then try the suggested steps to fix the problem.
What's wrong?
My document didn't print at all.
My document printed, but it doesn't look right, or it printed only partially.

**If you are having trouble printing, use the Print Troubleshooter to help isolate the problem.**

**Reason:** The most likely reason for getting such a message is that you did not uninstall a program using Win95's Add/Remove Programs or the program's uninstall utility, or the uninstall program did a poor job and left stray references to program system files in the System.ini file or the Registry.

**Solution:** If the file has a .386 extension, you need to edit the System.ini file. If you can start Win95, click Start, and then choose Run. The Run dialog box opens. Type the command **sysedit** in the Open field, and then click OK.

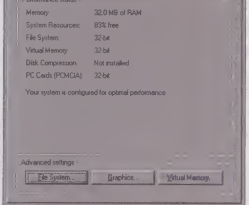
The System Configuration Editor dialog box opens with all of your system configuration file windows open in a "cascaded" fashion, with Autoexec.bat in front and the title bars of all other files visible behind it. Click the title bar for the System.ini file, and then scroll through the file until you locate the offending line. Type a semicolon (;) in front of the offending line to "comment" it out. Windows ignores files with a semicolon because information that appears after a semicolon in these configuration files is supposed to be information left by the programmer, not actual commands.

If you can't start Win95, restart your computer, but press F8 after the POST (power on self test) until Win95 displays the Startup Menu. Select the Command Prompt Only selection and the system opens in MS-DOS at the C> prompt. Type the command **edit system.ini** and the DOS Edit program opens where you can locate the offending line and type a semicolon in front of it.

In either case, save the System.ini file, then exit, and restart the computer. Win95 should start without further difficulty.

If the offending file is a VXD file, and you can figure out what program left it behind, try installing the program and then uninstalling it again. This should flush the bad file from the Registry, but if it doesn't, or you don't know which program caused the problem, you have one more option: You can go directly into the Registry and remove the offending line, but we must warn you to tread lightly in the Registry. You can edit it directly, but be careful that you remove the correct file.

If you wish to go this route, click Start, Run, type **regedit**, and click OK. Click the plus sign (+) next to HHKEY_Local_Machine, System, CurrentControlSet, Services, and finally, click the plus sign next to VxD. Scroll through the list until you locate the folder with the "bad" VxD setting. Click it to select it, and the settings for the chosen item appear on the right side of the window. Right-click the StaticVxD setting and select Delete. This removes the setting and should resolve your problem. When you restart Win95, the bad or missing VXD file message should no longer be there.




**To see the amount of available resources on your system, check the Windows 95 Performance tab.**

**Error Message:** When working with an OLE (object linking and embedding) application, you get an error message stating that Win95 cannot edit the object.

**Reason:** The object's source application is not loaded on your system or you don't have enough memory to run compound documents.

**Solution:** Win95 provides improved OLE support. This allows you to, for example, embed a sound object and spreadsheet into a Microsoft Word document. These are actually "live" objects created in another application, but you can embed them seamlessly into a single document. You can edit the embedded object in its source application by double-clicking it. When the source program opens, you can edit the object. When you save it, you return to Word and the saved object is embedded.

If you try double-clicking the object and receive an error message, check to make sure you have the source application loaded on your computer. If you do, and the system hangs each time you try to access the source application, you may not have enough memory to run the program. Check your system resources by right-clicking the My Computer icon on your Desktop and selecting Properties. Click the Performance tab and review the available system resources. If you discover that your system is low on resources and you want to use this feature, you may have to shut down all other open programs or upgrade your computer's memory.

■ **You're On Your Own.** While this is by no means a comprehensive list of error messages presented by Win95, it does provide you with information about several of the problems you may encounter while working with Win95. And some of the solution suggestions we provide here can also give you some ideas about how to solve other errors.

For more information, search the Microsoft Knowledge Base from the Microsoft Product Support Services page (http://support.microsoft.com/directory/self.asp). Click Searchable Knowledge Base, select Win95 from the My Search Is About drop-down list, type a question or a few key words, and click Go. LS

*by Ron Miller*

# The Windows 95 Registry

## Making Sense Of Its Keys & Values

In the beginning of Windows, there were INI (initialization) files that kept track of system information. The two main INI files were System.ini and Win.ini, and they organized information about your hardware and software into a usable form, with information about such things as your font files, device drivers, and the location of the windows you opened on your Desktop.

But there were a couple of problems with INI files: First, they were so useful that many types of hardware and software began to keep information not only in System.ini and Win.ini but also in INI files of their own. So many INI files were being created that there were increasing problems with clashing information because the INI files were not coordinated. Second, INI files had a hard-coded file size limit of 64KB, and that limit was quickly exceeded by programs, making the INI files unusable.

So, starting with Windows NT (and then later with Windows 95), Microsoft replaced most of the functions of INI files with a database system called the Registry. The **Registry** is a hierarchical system of keys that describe most of the functions of your hardware and software, including preferences and registration keys, settings for your printer and other hardware, and all the layout and functions of your Desktop and Windows system.

The Registry also controls interaction between applications, such as when you cut and paste information from one piece of software to another. In addition, the Registry is where Windows tries to keep track of and resolve conflicts around the use of system resources such as memory allocation and IRQs (interrupt request lines). Starting with Win95, the Registry file was able to be of variable size, letting it grow as you add software and hardware to your computer. On most modern systems, the Registry contains thousands of pieces of information.

Only 32-bit applications use the Registry, and so INI files still exist. If you use 16-bit application files, they are controlled by the information in the INI files that remain.

**The Structure Of Your Registry.** The Registry database has a specific structure, arranged in a hierarchical manner. There are data files pointing to the correct device drivers for all your hardware components, and control information for your applications default data and file locations, installation dates, version numbers, and serial numbers. Each bit of information is stored as a separate key.

Some of the controlled functions are user-specific, such as Control Panel settings and Desktop preferences. Some are set by the system itself, allowing it to find the correct information for using your hard drive and monitor, for example. Data about the computer itself is recorded in a set of keys connected to the machine; user-level data is in a separate set of keys. Settings for the system file (such as virtual memory management and network settings) are shared by all users. The user configurations change depending on who is logged into the machine.

Your Registry is kept in two files, both found in the C:\WINDOWS directory. The first file is System.dat, which contains all data affecting the entire system. The second file is User.dat, which contains all data affecting particular users. If more than one user is set up for a particular machine, there will be more than one User.dat file, found in directories labeled with the user login name, for example: C:\WINDOWS\PROFILES\USERNAME\User.dat. These files are at the top level of the hierarchical structure of the Registry.

These two files are hidden and marked as read-only, although Windows can write to them. Unless you set your Windows preferences to show you hidden files, you won't even know they are there. To see them so you can back them up before editing your Registry, double-click My Computer, open the View menu, and click Options. Then select the View tab, and click the Show All Files radio button.

You also can set their attributes to allow you to write to them directly, but most of us will be more at ease using the Registry Editor that Windows provides (we'll include more about this later in the article).

Inside System.dat and User.dat are handle keys, which display on-screen as HKEYS. HKEYS are the top-most level of data organization within the Registry. There are six types of HKEYS.

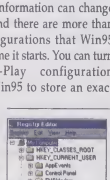
First, you'll see HKEY_LOCAL_MACHINE, which actually contains information from two other classes: HKEY_CLASSES_ROOT and HKEY_CURRENT_CONFIG. Information from

HKEY_LOCAL_MACHINE loads completely when you boot your PC. When you want to edit the information, you'll probably find it easier to do using these higher-level directories.

HKEY_CLASSES_ROOT actually has the same information that is found in HKEY_LOCAL_MACHINE\Software\Classes, and HKEY_CLASSES_ROOT\HKEY_CURRENT_CONFIG\System\Current Control Set contains the same information as HKEY\LOCAL_MACHINE\System\Current Control Set. The information found in these keys includes the data for all of your software and hardware preferences and associations, and the system information for Windows itself.

Another key, HKEY_DYN_DATA, contains Plug-and-Play information and stays in your system's RAM. This information can change with every startup, and there are more than 1,600 potential configurations that Win95 must consider every time it starts. You can turn off the Plug-and-Play configuration at startup, forcing Win95 to store an exact resource configuration for every device. To do this, click the Start button, Settings, and Control Panel. Double-click the System icon. Select the Device Manager tab, the device you want to configure, and then click the Properties button. If you see a Resources tab display in the next dialog box, then you can see if the device is configurable. Click the checkbox next to Use Automatic Settings to remove the check mark. Select the type of setting you want to change, click Change Setting, and then select the settings you want. Make sure you know which settings are correct for your type of device (such as its IRQ and input/output range) or you might create hardware conflicts in your system.

Some devices, such as modems, may be controlled through their own applets. In this case, you can't alter their settings within the Registry, and you'll have to use their software instead. HKEY_DYN_DATA also contains the performance information that is reported to you through the Windows System Monitor.




**This is an overview of the HKEYS and the upper-level subkeys for five of the six HKEY types. Editing these keys is one of the many ways to troubleshoot problems with your operating system. Just be sure to back up your System.dat and User.dat files, as well as important data, before making any changes.**

User-level information is kept in HKEY_USERS and HKEY_CURRENT_USER (which is actually a subset of HKEY_USERS). User-level information includes Desktop settings and device information for each user's login ID.

Beneath the HKEYS, data is divided into subkeys and sub-subkeys, making it easier to find single pieces of information. For example, under HKEY_LOCAL_MACHINE, you will find the Software key, and under that, you'll see the Microsoft subkey. Then, under that subkey, you'll see sub-subkeys for various Microsoft applications on your machine, such as Internet Explorer or Outlook Express. Many of the items listed will be things you didn't even realize were on your machine. They may be subparts of other software as well as various hardware settings.

The actual data settings are called values. Values are the basic blocks of the Registry, and they come in different types: three types of plain text and three types of other data. Data that is kept in text are called strings. There are three kinds of string values. REG_SZ, for example, is a single text string. This can be either a name or a number. Descriptions, titles, file paths, and instructions are all Registry values that are stored as text strings. Although this information is tedious, it is important to understand exactly what kind of information the Registry stores so you can input data correctly and understand the different editing menus you will see.

All these data types have their own edit windows, which indicate which data type you are editing. All the windows consist primarily of a field where users type entries, and none of them will tell you if you've done anything wrong. Therefore, before you even touch your Registry, it's important that you read the next section of this article and follow its advice to safeguard yourself against disastrous consequences.

■ **Using The Registry Editor.** We cannot emphasize this strongly enough: *Before you do any editing in your Registry, BACK IT UP!* Backing up the Registry is simple: just make copies of your System.dat and User.dat files (again, you'll find both in the C:\WINDOWS directory). Copy them to a diskette or to another part of your hard drive, or both. Also, make sure you have a startup diskette that you can use to boot your computer just in case you make a change to your Registry that prevents your computer from booting itself.

Changes you make to your Registry can affect your system seriously if you don't know what you're doing. You can make your system unworkable with a single typo. You don't want to have to reinstall Win95 entirely, which is what could happen. And Microsoft won't give you any help with this at all; editing your Registry is an entirely unsupported action. No one bears responsibility for the changes except you, so do yourself a favor and always make a backup of your Registry before you begin editing. (Of course, backing up your important files on a regular basis to removable media is also a good insurance policy.)

To access the Registry Editor, open your Start menu, and choose Run. In the Open field, type **regedit**. If you want to, you can type the command **regedit /e**. This specifies that the Registry Editor should export the Registry to a text file before opening.

(*NOTE: Exporting the Registry into a text file is actually another way to keep a backup of your Registry because you can import the text file later if you need to. You can even edit the Registry as plain text. Be aware, however, that your Registry is a huge file when it's in plain text, with many thousands of lines to it, so this probably isn't the best way to perform Registry editing tasks. Still, it is one more way to perform a backup. To make a plain-text copy of your Registry file, use the Export command under the Registry menu in the Registry Editor window. To import a Registry text file, use the Import command from the same menu.*)

When the Registry Editor starts, you will see the six top-level HKEY classes on the left. There are also some menu options along the top: Registry, Edit, View, and Help. You may already know which value you want to change (for example, if you want to change the default pathway where a certain program stores data). Using the information we previously discussed, you might know enough to look in HKEY_LOCAL_MACHINE\Software to find the manufacturer and name of the software you want to change. If you're not sure where a given key is kept, you can simply search for it. Press CTRL-F on your keyboard to display a Find window on-screen. Type the string you're

looking for, and the Registry Editor will find the closest match. Pressing the F3 key will take you to the next match.

You can also just click the plus sign (+) next to the HKEYS, which will display the subdirectories showing subkeys. Subkeys can also have plus signs, showing you that there are more levels of subkeys available. Remember that not all programs keep their information here. You may need to use the program itself to change some settings. When you select a key or subkey, the value for that key will display on the right. If there is no set value for the key, you will see a logo marked Default under the Name column, while Data will indicate: "Value not set."

Once you have found the key you want to change, click the Name of the value to select it. Right-click and choose Modify from the pop-up menu. This opens the edit window for that data type. The context menu here might also give you a choice to Remove or Rename this value. If you find you have opened a window for editing binary or hexadecimal code, please make sure you know what you're doing! Entering plain text into these types of data fields won't work and can hurt your system.

If you've opened an edit window by mistake, you can back out by pressing the ESC key on your keyboard. If you want to proceed, type in the value you choose to use, and then press ENTER. You should see your new data displayed in the window.

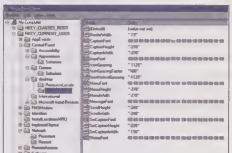
You can also access these functions in the Edit menu on the Registry menu bar at the top. Other examples of functions you can use through the menu bar include requesting to view a Status bar (View menu) or printing the Registry (Registry menu). There is also a small Help file available from the menu bar (Help menu or press F1).

Changes to the Registry are saved automatically. You can leave the Registry Editor at any time by closing the window.

■ **Resolving Registry Errors.** Like any database, your Registry can develop errors or become corrupt. If you find that you suddenly have boot errors or blue screens when you've just added a new piece of hardware or software, you may have an error or conflict in the Registry. Errors can also develop when you use the Registry Editor to change the Registry (or any other time something in your system changes or fails).

Even though software and hardware developers work to keep their products compatible with all the other products on the market, it simply isn't possible to be sure that everything on your system will work together smoothly. This is a particular problem with device drivers (small pieces of software that tell Windows how to operate the hardware attached to your system, such as printers). It also is possible that you may not have the correct drivers for your system. Registry errors might also develop when you uninstall software because most uninstall programs will attempt to delete the related program keys from your Registry. If the uninstall program malfunctions, an error can result.

In any case, whenever you change your hardware or software configuration, as well as when you edit the Registry yourself, watch out for immediate signs of trouble with your machine. Registry conflicts may be flaky, and



**Here is a sample of a Registry key, and in this case, the window locations that you have set for your Windows 95 Desktop.**

## How To Recover & Restore The Registry

The most important thing you can do before you edit your Registry file is to back it up! The easiest way to do this is to copy the two primary Registry files, System.dat and Users.dat, onto a diskette, or to another directory on your hard drive. We recommend that you do both. You can find these two files in your C:\WINDOWS directory, and once you create a backup, you can always restore your Registry from the backup.

You can also back up your Registry by using a program called Configuration Backup (Cfgback.exe), which is included with Windows 95. However, because Configuration Backup doesn't automatically install when you install Win95, you'll need to find it on your Win95 CD-ROM in the directory labeled OTHER\MISC\CFGBACK and install it yourself.

Next, create a directory on your hard drive and copy all of the files from this CD-ROM directory to the new directory you just created. Set up a shortcut for Configuration Backup on your Desktop or in your Start menu. Now you can run Configuration Backup to create a Registry backup (only nine backups can be stored at any one time).

The advantage of using Configuration Backup is that it lets you view all the Registry backups on one screen, and makes choosing the backup you want a bit easier.

In addition, make sure you also have a Win95 Startup diskette on hand before you begin editing your Registry. To make a Startup diskette, click the Start button, Settings, Control Panel, and double-click Add/Remove Programs. Select the Startup Disk tab, click the Create Disk button, and follow the directions on-screen. The Startup diskette is what you should use to boot your computer if the changes you've made to your Registry render your system incapable of booting itself.

Once you restart your computer with a Startup diskette, copy the backup versions of the System.dat and Users.dat files into your C:\WINDOWS directory, overwriting the edited versions that no longer work.

If you haven't made a backup of your Registry yet, there is still a way to restore your Registry by using a command within MS-DOS. Shut down your computer from the Start menu, and choose Restart In MS-DOS Mode. At the MS-DOS prompt, type **scanreg /restore**, and then restart your computer. This command restores your Registry to its last functional state, and therefore, any edits you've made since then will be erased. □

not show up consistently. But if you start having problems after a change, a Registry error may be the problem.

Again, keeping backups of your Registry is crucial. If you have a backup, you can simply copy those files into your WINDOWS directory and see whether that solves the problem. See the "How To Recover & Restore The Registry" sidebar for more information about restoring your Registry from backup copies.

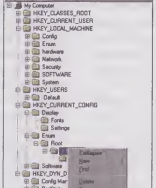
In addition, you might want to get a copy of a program called RegClean. RegClean was developed by Microsoft to help clean up erroneous and unneeded Registry entries. RegClean is a standalone program, and it will save backups of your Registry before deleting anything, just in case you need to restore the Registry for any reason. You can view more information about this program and download it directly from a page on the Microsoft Knowledge Base (http://support.microsoft.com/support/kb/articles/Q147/7/69.asp).

Also, make sure your virus scanning application is up-to-date, and then perform a full system scan. Registry entries are a favorite target for viruses because they control nearly every function of the machine and its operating system and software.

■ **Quick Fixes.** In this section, we include some tips you can use and changes you might want to make to your Win95 Registry. As you're editing the Registry and working with a deep subkey within its hierarchical structure, especially one with a lengthy hex string as its name, you can use the Copy Key Name command from the Edit menu to copy it onto the Clipboard. By doing this, you can simply paste the name rather than trying to type everything (and with accuracy).

**Changing paths.** You can use the Registry to correct a problem that occurred because you installed Win95 from a CD-ROM at a different drive letter location than the one you presently use. For example, if you've added another hard drive to your system and your CD-ROM drive is now labeled as E: rather than D:, Win95 will still look for the installation files at drive D:, such as whenever it needs a Windows device driver. Because it continues to incorrectly access drive D:, you will have to tell Win95 repeatedly to check the new drive letter location of E:. This is because the installation is linked to the Registry key at HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Setup, which contains all the paths that Win95 uses. Find the one that is in error, and change it to your correct drive letter.

**Protect your Registry from accidental overwrites.** One Windows default that can be dangerous for you concerns files with the REG file type, which are the Registry export files you can create in the Registry Editor. When you double-click this type of file, Windows will automatically import that file into your Registry, overwriting any information that the Registry presently has. This can be a disaster if you don't have a current Registry backup available and you overwrite valuable Registry information.




**When you right-click any key or value, you will see a pop-up menu that lets you choose from several actions, such as creating a new key, searching for a key, or copying the key name.**

To make sure that this doesn't happen, you can change the default action associated with the REG file type. The simplest way to do this is to open Windows Explorer and find a file of the REG type. Press the SHIFT key and right-click the file. When you see a menu called Open With, choose Notepad, and then click the option next to Always Use This Program To Open This Type Of File. Click OK. Now, if you or anyone double-clicks a REG file, it will open as plain text into the Notepad application rather than overwriting your Registry. You can still import the REG file if you want by selecting the Import option from the Registry menu in the Registry Editor.

**Find CD keys for software.** Perhaps you need to reinstall a piece of software, but you've lost your CD registration key. Before now, you'd be out of luck. But many pieces of software (not all) keep their CD keys in plain-text form in the Registry. Among other vendors, Microsoft does this. So, if you've lost the CD key for your copy of Microsoft Office, for example, but you still have the Registry entry, find the keys for that piece of software at H_KEY_LOCAL_MACHINE\Software\Microsoft\Office. You may have to search around each subkey until you find where the registration key is stored. For Office, it's in a subkey called Registration\ProductID. Other software might store the ProductKey under another name. Then, when you find it, copy the ProductKey data and paste it somewhere safe.

**Tip of the day.** You also can edit the Windows Tips that you see when Win95 starts. Look for the key H_KEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Explorer\Tips and you'll see the entire list of plain text tips that Win95 stores. You can change any one of these to say anything you like, or add more if you like.

**Reappearing data strings.** Finally, you may find that data strings reappear after you've removed them from your Registry. If this happens, check your Win.ini file. It may be adding information back into the Registry when you boot.

If needed, remove the lines from Win.ini to make that data disappear permanently. But please note that editing and making changes to your Win.ini file, as with any system file, can cause problems with your system startup. If you enter incorrect information, your software or hardware may not run correctly or may cause conflicts. If you delete necessary information, parts of your system may no longer work. So make sure you have a backup copy of Win.ini saved before you make any changes.

■ **Customizing Your System.** Despite all of the warnings we needed to tell you about the dangers of editing your Registry, there are actually a lot of useful functions gained by Registry editing. In addition to functional changes, such as correcting software or data paths and removing old Registry keys, there are ways to use the Registry to customize your system and make your computing experience more convenient and pleasant. We'll explain a few of those modifications in this section.

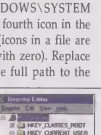
**Deleting and renaming Desktop icons.** You can remove items from your Desktop, even if right-clicking doesn't give you the option of deleting them. This includes the icons for My Computer, Recycle Bin, and others. You can also choose to rename these files even if Win95 does not normally let you. To edit these items, it helps to know the binary codes under which they are stored in the Registry. Here are some of the most common items:

- Control Panel {21EC2020-3AEA-1069-A2DD-08002B30309D}
- Printers {2227A280-3AEA-1069-A2DE-08002B30309D}

- Recycle Bin {645FF040-5081-101B-9F08-00AA002F954E}
- My Computer {20D04FE0-3AEA-1069-A2D8-08002B30309D}
- Network Neighborhood {208D2C60-3AEA-1069-A2D7-08002B30309D}
- Inbox {00020D75-0000-0000-C000-0000 00000046}
- Desktop {00021400-0000-0000-C000-0000 00000046}
- Shortcut {00021401-0000-0000-C000-0000 00000046}

If you would like to delete one of these from your Desktop entirely, see the keys under HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Explorer\Desktop\NameSpace. The keys are shown as binary codes. Click the one for the unwanted icon and you can delete it from your Desktop (unless you think you might need it again at later date). You can also choose to simply change the name, if you prefer.

**Changing default icons.** You can also change the default icon for any of the hard-wired icons in Windows, such as the default icon for folders (also called directories). Open the Registry Editor, look for HKEY_CLASSES_ROOT\Directory\DefaultIcon, and select that key. The default value displays as: "C:\WINDOWS\SYSTEM\Shell32.dll,3." This is the fourth icon in the file known as Shell32.dll (icons in a file are always counted starting with zero). Replace the default value with the full path to the icon file you want to use. If it is a single icon, you will not need the ",3" at the end of the address. If you are using an icon from a file that contains more than one icon, remember to count from 0 to choose the correct number.




**HKEY_CURRENT_USER contains preferences that only apply to the present user's login ID.**

**Automatically refresh your file list.** When you add a new file or folder using Windows Explorer, the file or folder is added to the end of your file list, and sometimes you won't see it in the list on your left unless you press F5 on your keyboard to refresh the list. You can use the Registry to set a new default that forces Explorer to refresh your file window automatically.

To do this, open the Registry Editor and find the key at KEY_LOCAL_MACHINE\System\CurrentControlSet\Control\Update. Edit the UpdateMode value that displays in the right pane, setting it to 00. Close the Registry Editor window. Now Windows Explorer will automatically refresh its windows any time you make changes.

**Control context menu options.** When you want to create a new folder or file from within Windows Explorer, you right-click to display a context menu, and then choose New. However, as you add more and more applications to your system, each with its own file association, the list of files you can create with that "New" option becomes enormous.

You can choose which files appear in the context menu by controlling the file type associations through the Registry. All 32-bit applications are controlled in the HKEY_CLASSES_ROOT section of the Registry. If you look at the list of keys in this section, you will see that some of them have plus signs beside them. These keys have subkeys that associate them with specific file types. By deleting the subkey from this file type, you'll remove the associative link between them, and this file type will no longer display in your context menu in Windows Explorer. There is one catch: Removing this association also means that you can no longer just double-click a given file type and automatically launch its corresponding application. Only you can decide how to customize your file associations to best meet your needs.

You can re-create the association link by right-clicking a file type in Windows Explorer and choosing the application from the Open With list.

**Direct downloaded executable files.** When you first download an EXE (executable) file, Internet Explorer displays a window asking you whether to save the file to your hard drive or run the file from the remote location. There is also a box you can click so that IE will always follow the routine you choose and not ask every time you download an EXE file.

If you want to make a different choice (from the routine you chose previously), you can force IE to show you that window of choices again. To do this, open the Registry Editor and find the appropriate key at HKEY_CLASSES_ROOT\Exefile. Change the EditFlags value from d8 07 01 00 (don't ask any more) to d8 07 00 00 (always ask). Close the Registry Editor window. Now, the next time you download an EXE file, you will see the window appear on-screen, asking you for directions.

**Display thumbnails.** You can set your Registry so Windows shows you a thumbnail of BMP files rather than the default icon you normally get. Open the Registry Editor, HKEY_CLASSES_ROOT, and click the plus sign next to Paint.Picture (you'll need to scroll down quite a bit to find Paint.Picture). Choose the DefaultIcon key or create one if it doesn't exist. To create the key, right-click Paint.Picture, and select New. Then, right-click the new key and choose Rename. Type **DefaultIcon** to name the new key. Open the DefaultIcon key and double-click Default in the Name column. Set the value to %1. Close the Registry Editor window. You should now see your BMP files with a thumbnail to the side, rather than a simple icon.

This not only works with files stored in the BMP format, but it also works with any BMP files, no matter what program was used to create them, and no matter what program you have associated with the BMP file type.

■ **Registry Resources.** There are dozens of useful things you can do with your Win95 Registry, many more than we can describe in this article. If you want to learn more about your Registry, here are a couple of in-depth resources that can teach you what you need to know.

First, start your research at our Smart Computing Web site (http://www.smartcomputing.com). Scroll down the page until you see our search tool. In the field below Enter A Subject, type **Win95 Registry**, and click Search to find articles in our archive covering more about Registry terminology, problem solving, and customization tips.

Second, check out Windows 95-L FAQ: The Registry (http://nospin.com/pc/faq/95regedit.html), which has been compiled by the Win95 mailing list members. This FAQ not only contains useful technical information, such as the list of binary key codes for various parts of the Win95 system (see http://nospin.com/pc/faq/95regedit binary.html), but it's a resource for tips submitted by list members from all over the world. LS

*by Jennifer Powell*

# CPUs

## Uncover Potential Processor Problems

The brain of your computer system is your system processor, which is also known as the CPU or central processing unit. The CPU is truly a technological wonder; it is less than a square inch in size and contains millions of tiny transistors that work together to let your computer execute hundreds of millions of instructions per second. Every PC has at least one CPU (some have more than one), and the speed and characteristics of the CPU are the primary determinants of the performance of your PC.

The CPU is a marvel of miniaturization and complexity. Fortunately, it is also one of the most *reliable* of all the components within your PC. Despite this, on occasion, you may have CPU-related problems. To determine if you are having CPU problems, follow along as we look at a few of the common problems you might find and show you step-by-step instructions for troubleshooting them. We also cover the unusual circumstances under which you might need to replace your system's CPU. (*NOTE: Before you open your case, turn off the PC and unplug it. Also, never touch the pins of a CPU or any of its other metal parts.*)

■ **System Won't Start.** One common problem experienced by most computer users from time to time is the frustration of a system that won't start up (boot) at all. This problem can be rather annoying because there are so many different possible causes. When you have a dead PC, you must first attempt to isolate what is causing the system to play dead. Some of these factors are CPU-related, but most are not. Therefore, the following diagnostic steps will only help you determine if your CPU is involved in the problem. (*NOTE: If you get a new PC and it won't start at all, it is likely that the machine is either defective or that something has come loose inside the case. The best course of action is probably to return the computer to the point of purchase.*)

**Address any changes.** If your system was working fine for a long time, but stopped being able to boot after you changed anything in the PC, then that change is probably the culprit. If you added a new hardware device, remove it, for example, and see if that fixes the problem. If it does, you have a configuration problem.

**Check the power.** Determine if the system is getting power. If you turn on the PC and nothing happens at all—no light and no noise from the fans inside the computer—then you probably have a power problem. Double-check the electrical outlet the PC is using. Try plugging the PC into a socket in a different room. If necessary, have a professional replace your PC's power supply.

**Check the video.** If the system has power, see if it is producing any video output. Look for messages that might indicate where the system hang up is. If there is no video, try a different monitor with your system to see if the monitor is the problem.

**Check internal connections.** Unplug the PC and carefully open it. Check for any loose connections such as cables that have come out of their proper sockets. Make sure there are no screws or other small parts sitting where they should not be. Ensure that you have all your expansion cards properly seated in their slots. Make sure all drives have their power and data cables securely fitted.

**Find CPU evidence.** If, after checking all these, you cannot get the system to start, you need to look at the evidence to decide if the CPU is likely to be the part of the problem. If the PC has worked before, and you changed something and that caused the PC to not boot, then the problem is almost certainly not the CPU. Similarly, if the system produces video or shows other signs of life, then the CPU is probably fine. If you have power, but the system won't do anything else at all, it could be the CPU. If so, you will need to have it replaced; see below for more on this.

If the problem is not due to a dead CPU, it could be due to a configuration problem that is affecting the CPU. See the next section on lockups and crashes for more information on dealing with those.

■ **Lockups & Crashes.** If problems with an utterly dead PC are frustrating, then problems with **lockups** (where the system freezes) and **crashes** (where programs stop working and give a system error) are probably even more irritating. The main reason is they are often intermittent, occurring at seemingly random intervals. The CPU is sometimes the cause of lockup and

crash difficulties, but these problems may not be the CPU's fault. Instead, they may be from how the CPU is installed or configured. System stability problems are quite difficult to diagnose, but following these steps may help:

**Look for patterns.** First, determine if the lockups occur truly at random intervals or only when you are doing certain things with your PC. If the problems are predictable, then whatever hardware or software you are using when you have the crash are part of the problem. If crashes always happen when you are using a particular application, then it is probably that application or the OS (operating system) that is at fault. If the CPU is causing the lockups and/or crashes, it is more likely that the lockups or crashes will be totally random.

**Check for software causes.** Second, use an up-to-date virus scanner to check your system for viruses. (They often cause crashes.) In addition, check your hard drive for file system problems using a program such as ScanDisk and then fix the errors. Make sure all hardware devices are using the right drivers, and update them if possible.

**Check hardware configuration.** Refer to the instructions given in your system or motherboard manual for how your system is supposed to be set up. In particular, look for any instructions on how the motherboard **jumpers** (on/off switches) are supposed to be set for the type of CPU you are using. If the jumpers are set incorrectly, this may cause the CPU to run unpredictably. (*NOTE: If you bought a premade system, you may not have this information in your manual, and the PC will usually have been correctly configured at the factory.*)

**Check BIOS settings.** BIOS (Basic Input/Output System) settings are options that control how your PC's CPU, motherboard, and other hardware devices function. You can change these settings by pressing the appropriate key (it should tell you which one on-screen) on your keyboard as your system starts and then traversing a set of menus. Like hardware jumpers, if they are set incorrectly, your system may not work properly. Consult your system manual and check them to make sure they are set as they should be.

**Check system cooling.** Improper cooling of your CPU or system can cause lockups and crashes. Particularly suspect this if the system often crashes after being on for a period of time. See the "Cooling Concerns" sidebar for more information on how to check for cooling issues.

Ultimately, you will not be able to diagnose the cause of many crash or lockup problems. You may need to take the system in for service. Usually, the repair people will continue to troubleshoot the difficulty by swapping out various parts, such as the CPU, motherboard, video card, or memory, until they discover which device is causing the problems.

**Wrong CPU Type Or Speed Displayed.** Another problem you might encounter has to do with your system displaying the wrong CPU type or speed. Some systems give an indication of the type and speed of the system CPU when you first start them; others may let you check the speed of the CPU within the OS. Usually these reports are accurate, but under certain circumstances, you may see an incorrect CPU type or operating speed indicated. If you do, follow these steps to diagnose this problem:

**Incorrect operating system or software reports.** If Windows or a utility program is reporting the wrong type or speed of your CPU, it is most likely that the software was written before your CPU was created, so it just isn't recognizing it. You could try upgrading the software or OS, though it's more practical to just ignore the inconsistency because it probably won't affect anything else.

**Incorrect configuration.** The speed of the CPU is not only a function, in part, of the CPU but also of how the motherboard and other components have been set up. If you have a new system, you may have received the wrong CPU, or the PC may have been set up incorrectly. If this is the case, contact the system vendor immediately. If you built the system yourself, check all appropriate jumper and BIOS settings to ensure they are correct. In addition, check the CPU to ensure it is the one you purchased.

**BIOS upgrade issues.** If you put a newer CPU into an older motherboard, it may be that the type of CPU you are installing did not exist when the BIOS code on your system was written. If so, the BIOS may not recognize the

## The Dark Side Of Overclocking

The speed your system runs at is a function of not only the CPU's characteristics, but also the hardware and software settings of other system hardware, especially the motherboard. CPU manufacturers intend their hardware to run under particular motherboard settings. However, there is a way to make your system run faster: **overclocking**. This is the process of intentionally running a CPU at a higher speed than its manufacturer intended it to run at to get better performance. This is usually done by adjusting the system hardware settings to force the CPU to run at a speed above its rating.

Overclocking has become popular during the past few years because it is a cheap way of improving a system's performance. Overclocking is certainly a viable option if done properly, and if you are willing to accept its risks. However, in overclocking, you are usually running the CPU at a speed that its manufacturer didn't consider the chip capable of handling. This means overclocking can lead to numerous problems, including the following:

**Inability to boot.** If you overclock too much, the CPU won't be able to start up the system. Usually returning the CPU to a lower speed will correct this, but, on rare occasions, you may have permanently damaged the CPU.

**System instability.** Faster CPUs sell for more money than slower ones. For this reason, CPU manufacturers have an incentive to sell any given chip for as fast a speed as it can handle. This means a CPU's rated speed is the fastest the manufacturer thinks it can go reliably. If you overclock the processor it may run, but it may cause all sorts of system crashes or lockups.

**Overheating.** Running CPUs at higher speeds makes them generate more heat. Overclocking can cause you to overwhelm the normal cooling methods that would work for a chip in its default, nonoverclocked condition.

**Data corruption.** In some cases, running an overclocked system can lead to slow and subtle corruption of data on the hard drive.

This list includes most of the CPU problems discussed in the main article. Therefore, if you are overclocking, the first troubleshooting step is *always* to reduce the speed of the CPU to its proper value and see if that corrects the problem. Only return to the overclocked state after you have diagnosed and corrected the problem with your system.

CPU. You can sometimes correct this situation by upgrading the system BIOS code. However, you may need to upgrade the motherboard instead.

**Replace Your CPU.** CPUs are extremely reliable devices. Even if they are subjected to rather torturous treatment, CPUs rarely fail. However, they do sometimes die. Most CPU failures are caused either by prolonged periods of being run without adequate cooling or by electrostatic discharge. (CPUs are sensitive to static electricity, which is why you should never touch the pins of a CPU or any of its other metal parts.)

If you have a dead CPU or other CPU problems, you can't fix it; you must replace it. The following are some indications you may need to replace your CPU:

- **Dead PC.** If the PC is truly dead and shows no signs of life at all, and you have ruled out other causes such as a bad power supply.
- **Overheating.** If the CPU is running too hot, despite your being sure that everything within the PC is properly configured and being properly cooled, or if the CPU fan has failed and can't be replaced without replacing the entire CPU.
- **Instability.** Despite all your efforts to diagnose system lockups and crashes, you cannot find any cause.

Under these circumstances, replacing the CPU may be warranted. However, even here, the CPU may not be the troublemaker. Therefore, the best way to proceed is to take the entire PC in to a reputable service shop, and ask if someone would be willing to swap the CPU and see if it fixes the problem. Many good shops will do this as a courtesy. If swapping the CPU corrects the problem, then you know the old CPU is bad; consider buying a new one from the shop to thank them for helping you diagnose the bad part. If swapping the CPU doesn't correct the difficulty, you know the CPU wasn't the culprit.

One final tip: If for some reason you do need to replace the CPU in your system, consider getting a faster one. You'll need to double-check your system or motherboard manual to be sure that the faster one will work, but if it does, at least you'll get a performance benefit for your trouble. LS

*by Charles Kozierok*

## Cooling Concerns

Modern CPUs run at very high speeds. The faster a processor runs, all else being equal, the more heat it generates. Very early PCs produced so little heat they did not need special cooling devices, but today's fast units need special attention so they do not overheat. This usually takes the form of a special **heat sink** (a small metal device that absorbs and eliminates heat) and **fan** (an air circulating device that cools heat-generating components) attached to the CPU itself. If your system's CPU is malfunctioning, it is likely the problem is not with the CPU itself but with the cooling process.

The primary cooling system for your PC is the circulation of air through the entire system box. Power supply and case fans produce this airflow and cool all devices within the case. Any devices added to the CPU or other components are supplements to this primary cooling method. No matter how much attention you pay to cooling the CPU, if overall system cooling is not functioning properly, your CPU may overheat.

To ensure your PC's cooling system is working properly, follow these steps. (*NOTE: Before you clean inside your system or move anything around, turn off the PC and unplug it.*)

**1. Check system cooling.** Before you attempt to determine if any processor-specific cooling methods are not working, assess overall system cooling. First, if the PC is against a wall, pull it out so the wall does not impede airflow. Then, make sure all power supply and case fans are turning properly. If a fan has stopped, carefully clean it with a special computer vacuum cleaner or blow the dust off of it using a can of compressed air.

**2. Check the CPU cooling fan.** If your CPU has a cooling fan, check to make sure it is turning freely. These fans often fail after a year or two, which can cause the CPU to overheat. If the fan is not turning, clean it; failing that, have a professional replace it.

**3. Check for physical obstructions.** Sometimes loose cables within the PC may get in the way of the CPU fan and stop it from turning. You may not even notice these if you open the case because they sometimes change position. Secure such loose cables so they are away from the CPU fan.

**4. Check jumper and BIOS settings.** Much the way that incorrect hardware configuration or BIOS (Basic Input/Output System) settings can cause the CPU to lock up or crash, these mistakes can easily lead to overheating problems, too. With the wrong settings, you may be unintentionally **overclocking** (changing the hardware settings so it runs faster) your PC. (*NOTE: See the "Overclocking" sidebar for more information.*) Check your system's manuals to find the proper settings.

**5. Check heat sink connection.** The heat sink is the large metal object attached to a portion of the CPU. Make sure you have your heat sink properly secured to the CPU. First, make sure there is no gap between the heat sink and the CPU. Then, look for broken or loose clips that might indicate poor contact between the sink and the CPU. (*NOTE: Some CPUs have permanently attached heat sinks, so this is not always a concern. Also, some CPUs only contact the heat sink in one spot in the middle of the chip.*)

**6. Upgrade.** If the cooling is still not adequate, consider upgrading your system's cooling. You may be able to replace the existing CPU fan, or you can add more fans to let the existing CPU fan work more efficiently. (*NOTE: You can't easily replace some CPUs' cooling fans; you may need to replace the entire CPU.*)

# Motherboards

## Make Sure Your PC's Support Device Is In Working Order

The CPU of your computer is often called the brain of the computer, and this is an apt analogy: It is what does the thinking, so to speak. Our bodies, however, need more than a brain to function. They use a host of support systems that enable the brain and other body parts to operate properly. With your PC, one component provides most of these support functions: the motherboard, which is also known as the mainboard or system board.

The motherboard is a highly integrated component that actually includes several other important components, such as the system chipset, system BIOS (Basic Input/Output System) chip, and several interface controllers. Every component or peripheral your PC uses, including the CPU and even the mouse, connect in one way or another to the motherboard. As a result, problems in many areas of the PC can sometimes be motherboard-related, or one of the components integrated onto it.

To help you find out if your problems are motherboard-related ones, we will look at some of the most common problems associated with this important PC component. For each one, we provide step-by-step instructions of how to troubleshoot these difficulties. This includes a look at general system failure issues because these can be related to the motherboard, and a discussion of situations under which you might replace a part on the motherboard or the motherboard itself. We also discuss situations when you might want to update (flash) your system BIOS code, which is part of the motherboard. (The **BIOS** is a special piece of software built into most computers. BIOS routines control the startup process of the machines and other basic functions such as the keyboard, display, and hard drives.)

*(NOTE: This article assumes you are not attempting to overclock your PC.* **Overclocking** *means setting up your PC so its components run faster than the manufacturer of the components originally intended them to run. Usually you overclock a CPU, but you can do it to the motherboard on some systems. Overclocking your motherboard can lead to increased performance, but it can also cause many of the problems being discussed in this article. If you are overclocking, the first step to troubleshooting should be to undo the overclocking to see if the problem goes away when you run the system at its normal speed. Don't re-enable the overclocking until you have the system running properly under its regular settings.)*

**Malfunctioning.** Motherboards are generally reliable, but there are situations when they can fail. The main problem with diagnosing failed motherboards is related to the motherboard's central nature: Because the board is connected to every component, it is hard to isolate exactly what the issue is, even if the motherboard is the culprit.

In some cases, it is hard to tell if you have a problem that a bad motherboard might have caused. Signs of a potential problem related to the motherboard include an inability to boot the system, system instability (crashes and lockups), not being able to configure system components or expansion devices, or strange system errors. Bear in mind, however, that most problems that appear to be caused by a bad motherboard are caused by other components, bad BIOS settings, or hardware conflicts. Motherboard failure in a system that has been running for a while is rare. In a new system or one that has recently had a motherboard upgrade, these problems are more common but still not typical.

Diagnosing a bad motherboard can be a time-consuming and difficult process. Try these steps:

**Undo changes.** If the system was working until you made a change in the system's hardware, that change is almost certainly involved in the problem. Try undoing the change and see if the problem is fixed. If so, the new hardware is improperly configured, defective, or incompatible with your PC. (*NOTE: Sometimes the motherboard will have a hidden defect that the new device made apparent, but this rarely happens.*)

**Check connections.** Check all cables, wires, and connectors that are attached to the motherboard. Especially on a new system or a system with a recently upgraded motherboard, you may discover a cable that is loose or connected in the wrong place. You also may have a cable that is upside down. Check your cables carefully because most motherboards have multiple connections.

**Check installed components.** Improper installation of any of the devices that go into the motherboard can also cause an apparent motherboard failure. Usual culprits are a CPU that isn't inserted all the way, loose memory modules, or modules in the wrong sockets.

**Check for shorts.** Make sure metal parts in the system are not improperly touching the

motherboard and shorting it out. Your motherboard is probably mounted to your case with screws in spots designed for this purpose, but if the metal of the case touches the underside of the board in any other location, problems will result. In addition, be sure there are no foreign objects, such as screws, on or near the board.

**Check cooling.** If the system is not being cooled properly, this can lead to problems with the system as a whole. These problems can manifest themselves as motherboard failures. Make sure the CPU fan, if there is one, is turning clearly and check the power supply fan. (See the previous article in this issue for more information on resolving cooling problems.)

**Check jumper settings and BIOS settings.** Consult the system manual for your PC or motherboard, and carefully check all the hardware jumpers (on/off switches) and software BIOS settings to make sure they are correct for your hardware. Bad jumper or BIOS settings often lead to problems.

**Troubleshooting related components.** A bad memory module, CPU, video card, or other expansion card can cause your motherboard to malfunction. Try swapping these with ones known to work to see if you can resolve the problem. Remove any expansion cards that aren't strictly needed for operating the system to see if this resolves matters, too.

If after following these seven steps you have not found the problem, you may have a bad motherboard. See the section further down in this article for more information on motherboard replacement.

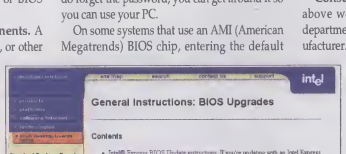
■ **System Clock & Date.** One of the components integrated on the motherboard is a system clock, which lets your PC keep the present date and time. Under some situations, you may find the date is being reset, especially when you disconnect the PC from its power source, or that the system time drifts from the correct time.

The motherboard contains a battery that maintains the BIOS settings, system date, and system time when the PC is off. Over time, this battery can lose power, which can cause the clock to start running slow. If the battery fails entirely, the date will be reset each time you power off your PC. Consult your system manual for instructions on replacing the battery. (*NOTE: On some motherboards, you can't replace the battery.*)

If replacing the battery doesn't solve the problem, your motherboard's system clock may be slow. You could replace the motherboard, but that's an expensive and time-consuming option. Alternately, make use of one of the date/time set utilities available for free from major download Web sites on the Internet. You can use these programs to automatically synchronize your system's clock to that of atomic clock servers on the Internet, ensuring your PC's clock is always reasonably correct (assuming that you log on to the Internet regularly).

■ **Lost System Password Or Corrupted BIOS Settings.** The BIOS chip on most systems includes the ability to set a system password. When you have it enabled, you must enter the password to start the system. This is a useful security precaution, but if you forget the password, it can cause serious stress. If you ever do forget the password, you can get around it so you can use your PC.

On some systems that use an AMI (American Megatrends) BIOS chip, entering the default password of "AMI" or "ami" may unlock the system. This won't work on most newer machines, though. There may be a similar type of password for your BIOS; call your BIOS manufacturer to find out.




**Many motherboard manufacturers, such as Intel, will provide BIOS (Basic Input/Output System) updates on their Web sites.**

If this easy solution doesn't work, you will need to clear the system's CMOS (complementary metal-oxide semiconductor) memory. You may also need to do this if your system's BIOS settings become corrupted or are set to values so incorrect that the PC won't boot. The CMOS memory contains the system's BIOS settings, including the system password. It is kept intact using the same battery that holds the system date and time.

To clear the system's CMOS memory, try the following steps:

**Keyboard reset.** On some systems, you can clear the CMOS memory and reset the BIOS settings by turning off the PC, pressing and holding the INSERT or DELETE key, and then starting the PC. However, on most modern PCs, this will not work.

**CMOS clear jumper.** Some motherboards have a special hardware jumper that clears the CMOS memory. Consult your system documentation for instructions on using it. Usually, you open the PC, put the jumper in a special position momentarily, then replace it and reboot.

**Disconnect the CMOS battery.** If the system has no CMOS clear jumper, remove the battery. Turn the PC off, unplug the PC, and then remove the battery. Leave the battery out for about two hours (to allow residual power that may be in capacitors on the motherboard to drain off). Then replace the battery, plug the system in, and reboot your PC.

**Consult the manufacturer.** If none of the above works, contact the technical support department of the system or motherboard manufacturer. Someone there may have other ideas for clearing the CMOS memory, and these options may not be in your system's documentation.

(*NOTE: After you clear your CMOS memory, you will need to set up all your BIOS settings again or, your PC may not work properly. Consult your system or motherboard manual carefully. For more information on the BIOS, see the "BIOS" article in this issue.*)

■ **Hardware Not Supported.** New hardware and software are constantly being introduced to the PC world. Every few months, hard drives get larger and faster, new interfaces come out, and new operating systems are released. The system BIOS has special low-level code that is needed to enable support for some of the latest hardware. If the BIOS is not up to date, you may have problems adding new devices to the system. A common problem is the system won't recognize the full size or maximum interface speed of a new hard drive.

You may be able to fix such support problems by updating the system BIOS code. Most new PCs have what is called a **flash BIOS**, which is a special BIOS chip that you can update without opening the PC case at all. This process is called **flashing** the system BIOS.

Updated BIOS code is usually available for free download from the manufacturer of the system or motherboard. Check your BIOS

manufacturer's Web site or your motherboard manufacturer's site in the technical support section for information on this. For example, you can access BIOS updates at the Intel Web site at http://www.intel.com/design/motherbd/genbios.htm. Included with the code will be a flash update utility and specific instructions for accomplishing the upgrade.

Be sure to back up your PC before you start and follow the instructions exactly! You will usually be asked to make a clean boot disk and run the utility from that disk. After performing the upgrade, you reboot your system and the new BIOS code is installed, enabling the use of newer hardware. BIOS upgrades also sometimes correct bugs found in the code originally put into the motherboard.

**Fix & Replace Parts.** As mentioned earlier, a motherboard contains a number of integrated components. Most of these are permanently attached to the board, and you can't replace them. These include most of the logic chips, the memory and CPU sockets, and the expansion slot hardware. (You can replace these components if you have expensive desoldering and soldering equipment and the appropriate expertise, but it's not worth the hassle given that most motherboards cost no more than about $100).

Despite this, there are a few motherboard parts that you can fix or replace if you need to:

- **CMOS battery.** There are situations where you may need to replace the CMOS battery; you can do this on most systems. If you do this, be sure to use the correct replacement part.
- **System BIOS chip.** The system BIOS chip is usually in a socket, and you can physically replace it. Most motherboards have a flash BIOS so removing the chip is rarely necessary, but if the board doesn't have a flash BIOS, you may be able to upgrade the BIOS this way. In rare circumstances, such as a failed BIOS flash operation, you may have to replace the BIOS chip to get the motherboard to work again.
- **Drivers.** Some motherboards require special software drivers. Upgrading these drivers can correct certain problems with the system. Check the motherboard or chipset manufacturer's Web site for information on updates.

That's pretty much it. You can, of course, replace the cables that come with the motherboard, but they aren't, strictly speaking, part of the motherboard. (*NOTE: Although you can't fix broken parts, such as expansion slots or memory sockets, you can sometimes work around these problems. If a memory socket breaks, use a different one.*)

## Upgrade Your Motherboard

A motherboard upgrade is the most complicated of any upgrade you can do to a PC. Because the motherboard is at the heart of every PC, replacing it usually means making changes to other components, especially the CPU and system memory. In physical terms, upgrading the motherboard means disassembling much of the PC and then reassembling it. After you have backed up your system and purchased a new motherboard that fits your existing case, you will want to follow these steps to upgrade the motherboard. (*NOTE: This is just an outline, consult the instructions that came with your new motherboard and your PC; you may even want a professional to upgrade your PC.*)

**1. Disassemble the PC.** Before you can replace the board, you need to uninstall many of your system's components, including the video card, CPU, memory, and other components that plug directly into the motherboard. Disconnect all cables from the motherboard. (If they are not clearly marked, it is smart to attach some masking tape to them with a label saying where they went to on the old board.) If your case is small, you may also have to remove drives to get the motherboard out of the case.

**2. Remove the old motherboard.** Remove the screws that hold the old motherboard in place. Carefully slide the old board out.

**3. Install the new motherboard.** Follow the steps in this article to install the new motherboard and reattach all cables.

**4. Reassemble the PC.** Install all the components you took out in the first step, including the CPU, memory modules, video card, and any other peripherals.

**5. Change the drivers.** You will typically have to change drivers after this installation, and you may need to remove the old hardware from the Windows Device Manager (right-click My Computer, select Properties, and click the Device Manager tab) and install the new hardware there. □

2

**Replacement.** Motherboards receive more than their fair share of blame for general PC problems. In many cases, the motherboard is improperly set up or hardware devices connected to it are conflicting with each other. In fact, the majority of motherboards returned to vendors as defective are perfectly functional.

The motherboard is the single most difficult component to replace in the PC. Because the board is the largest and most central component, replacing it requires you to essentially disassemble much of the PC, including removing most of the other parts of the PC, such as the CPU, memory modules, and video and expansion cards. Therefore, you should replace your motherboard only as a last resort. Always exhaust other troubleshooting options first, including swapping more easily replaced components such as the CPU or memory. You should replace the motherboard only if you have successfully isolated a system problem to the board, or to a component of the board that you can't replace.

One final reason to consider a motherboard replacement is if you are upgrading your PC. In some cases, a motherboard upgrade will enable a significant performance improvement by letting you use a faster CPU or memory technologies. LS

*by Charles Kozierok*

# RAM

## Prevent Memory Errors

Memory errors can be among the most difficult to diagnose. The messages are cryptic and result from any number of problems beneath the surface. Because the computer's memory powers everything from booting up to downloading files to making spreadsheet calculations, faulty memory has far-reaching repercussions.

Having enough RAM installed can prevent some errors from occurring. And with today's reasonable RAM prices, anyone experiencing frequent memory problems should start by installing a sufficient amount of RAM.

As the computer's temporary memory source, RAM runs all programs that are open and stores data only as long as the computer has power. Trouble-free RAM keeps applications running smoothly while the computer is running. The hard drive is slower than RAM and has a different job. It stores memory permanently under normal operating conditions.

When a user runs many applications simultaneously or works with large graphics files, the computer stretches its RAM. When memory is full, the computer transfers data to the hard drive, a process called swapping. In a system that lacks memory, things run slowly and memory errors happen more often.

Here, we look at common error messages in Windows 95, Windows 98, and Windows Me. Then we look at several possibilities as to what might be causing each problem. Step-by-step instructions refer generally to WinMe, and refer to Win98 and Win95 where indicated.

### Error Message: Insufficient Memory

**Cause:** This is a common error that pops up when you try to open another program, but the computer is using so much RAM elsewhere that it cannot allocate sufficient memory to open this program.

**Solution 1:** Close all programs, then try again to open the desired program.

**Solution 2:** Close background programs. If this message pops up again, exit Windows and remove any TSR (terminate-and-stay-resident) programs. TSRs launch automatically every time you boot up your computer and run constantly in the background. Common TSRs are screen savers, antivirus programs, and fax/modem software. Although TSRs are unseen, they can consume a good amount of RAM. To disable background applications, click the Start button, Run, type **msconfig**, and click the OK button. Msconfig.exe will pop up. The Startup tab will show a list of everything that starts up with your system. Disable programs by unchecking them. When you want these startup programs back, run Msconfig.exe again and place a check mark next to the program you want to enable. Leave Explorer and SystemTray on because they are important to running the OS (operating system). Restart Windows and try again.

For Win95, restart your computer. When the bootup screen displays Starting Windows 95, press F8 and select the command prompt. Type **win** and press ENTER and SHIFT. This prevents programs from starting automatically. When you want these programs to start normally, just reboot as usual.

**Solution 3:** Remove unnecessary drivers. Old drivers might be eating into your computer's memory. A driver is a program that controls a specific device, like a printer or disk drive. A driver acts like a translator between the device and programs that use the device, telling the computer how to use that device. Some drivers come with the OS, such as the keyboard driver. In Windows environments, drivers have a .DRV extension. When you upgrade a device or replace it with a new one, you must also install a new driver. Usually, installing a new driver automatically overwrites the old one. However, the problem arises if your computer begins using the new driver with the new or upgraded device, but keeps the old driver loaded in memory. To remove unnecessary drivers, click the Start button, Programs, Accessories, and System Tools. Click System Information, select the Tools menu, and click Update Wizard Uninstall. If you have old drivers, a dialog box will pop up asking you to confirm that you want to remove them. If your system has no old drivers, the message will read, "No packages available for uninstall."

### Error Message: System Properties dialog box shows less memory than is installed

**Cause 1:** Virtual Device Driver Using RAM. First, check whether a virtual device driver is claiming a portion of your RAM. A virtual device driver has direct access to the central core of the OS, called the kernel. Certain programs need direct access to run smoothly and effectively. Virtual drivers provide this direct access.

**Solution 1:** Restart your computer without virtual device drivers by clicking the Start button, Run, typing **msconfig** in the open box, and clicking OK. Select the General tab and click Selective startup. Clear the Process System.ini file checkbox. Click OK and Yes when the computer prompts you to restart.

If the System Properties dialog box still displays an incorrect amount of memory, repeat the procedure above, but click Normal startup on the General tab. This should return your system to its previous configuration.

If stopping your computer from loading virtual device drivers causes the dialog box to display the correct amount of memory, you must determine which file referred to in the System.ini file is causing the problem, then disable that file. To do so, click the Start button, Run, type **msconfig** in the open box, and click OK. Click the System.ini tab, then double-click [386Enh]. Clear the checkbox next to the first line that doesn't start with a small Windows logo. Click OK and restart the computer.

If the problem recurs, repeat the process by unselecting the checkbox you just cleared and repeating the steps for the next line until the problem disappears. The file you cleared just before the disappearance is the problematic file. Disable this file by leaving its checkbox cleared until you find a permanent solution by reading the documentation that came with the driver, going to the manufacturer's Web site, or returning the driver to the retailer.

In Win95, start the system without loading drivers by pressing F8 when the screen displays Starting Windows 95. Choose the Command Prompt and rename the System.ini file by, typing ren **c:\windows\system.ini *.bak**. Since Win95 requires the System.ini file to load what you see when running Windows, replace the renamed file by typing **copy c:\windows\system.cb c:\windows\system.ini**. You must add code to the new file to load the mouse driver. Edit the new System.ini in a text editor and under the [386Enh] block, type **mouse = *vmouse, msmouse.vxd**, under the [boot] block, type **drivers=mmsystem.dll**, and on the next line add **mouse.drv=mouse.drv**.

Start Windows by pressing F8 when Starting Windows 95 is displayed and go to the command prompt. Type win. If this corrects the problem, the issue is probably isolated to either the [boot] or the [386Enh] sections of the System.ini file. Restore the original file and troubleshoot using the process of elimination. To isolate the cause, place a semicolon (;) at the beginning of lines you don't want to load.

**Cause 2:** Memory Mismatch. You might have a memory mismatch caused by a protected-mode driver. Protected mode is a type of memory utilization in which the processor allocates a certain section of memory to each program. Other programs cannot use this memory, so each program is protected from interference from other programs. When you instruct the OS to go into protected mode, the driver behaves differently or the system uses a different driver.

**Solution 2:** Click the Start button, Settings, Control Panel, and double-click System. If you don't see the item you are looking for, click View All Control Panel Options. Double-click one of the listed devices. In the resulting dialog box, on the General tab, select the Disable In This Hardware Profile checkbox and click OK. (In Win98, on the Device Manager tab, click one of the listed devices. In the resulting dialog box select the Disable In This Hardware Profile checkbox.) If you don't see this checkbox, go on to the next listed device. When you are prompted to restart your computer, click No. Repeat this process for each listed device except for those in the System Devices category. Restart your computer and click the Start button, Settings, Control Panel, and System. If you don't see the item you are looking for, click View All Control Panel Options. If you can now run your computer without getting the error message, enable one device at a time and test whether the error recurs. If the error recurs, the last device you enabled is most likely causing the error. Consult the device documentation or contact the manufacturer for information about configuring the device so it doesn't cause a memory conflict.

In Win95, click the Start button, Settings, Control Panel, and double-click System. In the Device Manager tab, select a device category. If there is an Original Configuration checkbox, clear it and press OK. If you have multiple configurations, clear the box of the one you are troubleshooting. If there is no configuration

## Memory Managers

More than a dozen memory managers, with names like RAMBooster, MemTurbo, and FreeMem, promise "dramatic performance improvements." They are downloadable from software vendors including ZDnet.com and WinDrivers.com. Many are free, and those that do have a price tag generally cost less than $20.

Third-party memory managers allow a PC to run more quickly and smoothly by using RAM more efficiently. They pledge to run more applications simultaneously, reduce the load time for huge files, and switch more quickly between memory-intensive graphics programs.

RAM caches (stores) recently opened files. When many files have been opened and Windows runs out of RAM, the system starts storing data on a part of the hard drive called virtual memory. This process, called swapping, transfers files from RAM into virtual memory. Once a file that was swapped into virtual memory is needed again, this process occurs in reverse. Managers run in the background, freeing up RAM wasted by Windows and other large applications, thereby using less virtual memory and more RAM. Because RAM is much faster than virtual memory, the system runs more quickly.

Some memory managers also defragment the system's RAM. Fragmentation occurs when files are divided into pieces scattered around the hard drive, rather than stored in one cluster. Fragmentation occurs naturally with a hard drive that is frequently creating, deleting, and modifying files. At some point, Windows must store parts of a file in noncontiguous clusters. Although fragmentation is invisible to users, it can slow down the rate at which data is accessed because the hard drive must search through different parts of the hard drive to put together a single file. Memory managers defragment a hard drive before the user asks for a file stored on that drive. That way the user doesn't have to wait while the disk puts the file together, or defragments it, before opening the file.

Memory managers also detect memory leaks before the leaks cause a crash. A memory leak is a bug that prevents a program from freeing up memory after the user quits the program. A program with a memory leak grabs more memory every time it opens, but doesn't release the memory when it's closed. Eventually the computer will crash due to lack of RAM.

Most users find that memory managers shave seconds off big tasks and slightly speed up a system that's low on memory. But a big jump in performance will only come from buying more RAM or a faster processor. With RAM prices dropping down below $10 per megabyte, memory managers are most wisely used as an accessory to a fully-equipped memory system. □

**New to the market, Double Data Rate Dynamic RAM is considered to be the fastest and most powerful type of RAM available.**

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**DIMM (dual in-line memory module) is the most common type of RAM found in today's computers.**

checkbox, select the Disable In This Hardware Profile checkbox. Repeat for all except those in the System Devices category.

**Cause 3:** Poor CMOS Settings. You may need to alter your CMOS (complementary metal-oxide semiconductor) settings. CMOS memory holds the date, time, and system setup parameters. On some computers, CMOS settings can disable a portion of your RAM, preventing Windows from recognizing the altered RAM. That causes the System Properties dialog box to show less memory than is installed.

**Solution 3:** To have Windows recognize all your RAM, disable the appropriate CMOS setting. Save your settings and restart your computer. Because CMOS settings vary for each computer, read your manuals and the manufacturer's Web site to find specific instructions. Be very careful because incorrect changes to these settings can lead to serious problems.

### Error Message: Out Of Memory

**Cause 1:** Memory Leak. An Out of Memory message can happen, even when you have a great deal of memory installed, if there is a bug called a memory leak in one or more of your programs. When you quit a program without restarting your computer the program should return memory resources to the system, but doesn't always do so. A memory leak results from a poorly written or defective program and prevents the program from freeing up memory that it no longer needs. The program grabs more memory every time you open it, but does not release the memory when you close it, until it finally crashes because no memory is left.

**Solution1:** To release memory, restart your computer and run the program again. Periodically reboot your computer to prevent this error message from recurring. If the program is new, return it to the software vendor in exchange for a new one.

**Cause 2:** Too Many Open Files. If restarting your computer doesn't solve the problem, you may be trying to open too many files or programs.

**Solution 2:** If you have many documents open or several programs running at the same time, quit any programs you are not using.

**Cause 3:** Not Enough Virtual Memory.You may not have enough virtual memory. Virtual memory is hard drive memory that the OS uses to supplement RAM. When a computer is using all its RAM, the OS puts the least-used programs into virtual memory. That allows the "real RAM," which is faster than virtual memory, to power the most-used programs. When you increase the amount of free space on your hard drive, the OS gets more space to use as virtual memory. If you allocate too little hard drive space for virtual memory, you'll get Out of Memory errors.

**Solution 3:** If you have more than one hard drive or if your hard drive is partitioned, start by determining which one the virtual memory is on. Click the Start button, Search, For Files or Folders. In the Search box, type **win386.swp**. In the Look list, click My Computer, Search Now or Find Now. The results list will show where the file is located.

To remove unnecessary items from the disk, empty the recycle bin, delete temporary files that are more than one week old, delete obsolete files or copy them onto a diskette and remove programs you never use.

If removing unnecessary items doesn't free up enough hard drive space to increase virtual memory, set your virtual memory to another drive that has more free space. Right-click My Computer from the Desktop, click Properties, Performance, Virtual Memory, then select the Let Me Specify My Own Virtual Memory Settings option. In the Hard Disk drop-down list, see if another drive contains more free space than drive C:. If so, select that drive and click OK. Close out and restart your computer when prompted to do so.

**Cause 4:** Too Many Programs Run Automatically. Your system might have too many programs set to run automatically when you launch Windows. If you have too many programs set to run automatically, you might not have enough free memory to run an additional program, even after you restart your computer.

**Solution 4:** To restart Windows without starting programs automatically, click the Start button, Run, type **msconfig**, and click OK. On the General tab, click Selective Startup. Clear the Process Win.ini file and load startup group items checkbox. Click OK and restart the computer when prompted to do so.

If the program runs after Windows restarts, change your configuration to prevent programs from opening automatically. To do so, reset the computer to Normal Startup by clicking the Start button, Run, type **msconfig**, click OK. On the General tab, click Normal startup, OK, and restart the computer.

Next, remove all shortcuts from the StartUp folder by clicking the Start button, Settings, Taskbar & Start Menu, Advanced tab (in Win98, it's the Start Menu Programs tab), then click Remove. Double-click the StartUp folder to see a list of the programs that run automatically. If there is no plus sign next to the StartUp folder, no programs are set to run automatically. In that case, click No and Next to continue troubleshooting.

Click each shortcut in the StartUp folder, then click Remove for each one. This deletes

shortcuts from the StartUp folder but it doesn't remove the corresponding programs from your hard drive.

To disable programs loading from Win.ini, click the Start button, Run, type **msconfig**, and click OK. Click the Win.ini tab and double-click Windows. Clear the Load= and Run= checkboxes, then click OK and restart the computer.

If you still receive an Out Of Memory message after starting Windows without loading items from the StartUp folder, reset your computer to Normal Startup before you continue troubleshooting.

To prevent programs from starting automatically in Win95, restart the system, press F8 when Starting Windows 95 displays, and proceed to the command prompt. Type **win** and hold the SHIFT key. If this solves your problem, you need to edit the Winstart.bat, the Win.ini, and the StartUp group to prevent files from starting automatically.

The Winstart.bat file loads TSRs used in Windows and can be edited using a text editor. Place a semicolon at the beginning of lines you don't want processed. The Win.ini can be edited in the same way. The load= and run= lines start programs automatically. Remove undesired entries or place a semicolon at the start of the line to remove it from processing. Finally, edit the Startup group. Click the Start button, Settings, and click Taskbar. Select the Start Menu Programs tab and click Advanced. Select the programs you want removed.

**Cause 5:** You might be receiving this error message because of a problem with the system's virtual memory settings. If you are managing your own virtual memory settings, let Windows manage them for you. (See above for an explanation of virtual memory.)

**Solution 5:** Click the Start button, Settings, Control Panel, and double-click System. In the system properties dialog box, click the Performance tab, Virtual Memory, Let Windows Manage My Virtual Memory Settings.

Do this in WinMe and Win98 by clicking the Start button, Run, typing msconfig, and clicking OK. Back up your current system configuration files by going to the General tab and clicking Create Backup. Click Advanced, Limit Memory To, then specify a reduced amount of memory. Restart your computer when prompted to do so.

In Win95, use any text editor (such as Notepad) to edit the System.ini file. Type the following line in the [386Enh] section of the file: **MaxPhysPage=<nnn>**. In place of <nnn>, type in the amount of memory you want Win95 to use.

To limit Win95 to the first 16MB of memory, add a line that reads MaxPhysPage=FFF. To limit Win95 to the first 8MB of memory, add a line that reads MaxPhysPage=7FF. Finally, save and close the System.ini file, then restart your computer.

If the Parity Error message stopped after you limited memory, one of the chips is probably defective. Use the process of elimination to determine which one is problematic. Manually remove each chip and restart the computer. Start by grounding yourself, opening up the case, removing the chips, and checking whether the problem still occurs when you reboot. The details of this process will vary depending on your case, motherboard, and other hardware.

**Cause2:** Mismatched Memory. Parity errors can be caused by a mix of parity and non-parity RAM modules (SIMMs, DIMMS, and RIMMS) on the motherboard.

**Solution 2:** Read your computer documentation or manufacturer's Web site to determine the type of RAM required by your computer. Then read your RAM documentation to verify that all the RAM you have added to your computer is the appropriate type.

If you find that you don't have the appropriate type of RAM, replace the mismatched sticks with ones that match.

**Cause 3:** Wrong Type of Memory. Some computers require a specific proprietary brand of RAM and refuse to function if another brand of RAM is installed.

**Solution 3:** Read your computer's documentation or the manufacturer's Web site to determine whether your computer requires proprietary RAM. If you find you do not have the appropriate type of RAM chips for your computer, replace them with ones that match. LS

*by Raya Tahan*

Error Message:

## System Halted During Startup

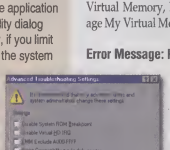
**Cause:** This message is unique to Windows ME. WinMe requires at least 32MB of memory to start up. A common way to free up RAM for a large application is to go into the System Configuration Utility dialog box and limit available memory. However, if you limit the available memory to less than 32MB, the system will halt when you try to reboot, generating one of the following messages:

- While initializing device IOS. Error: An I/O subsystem driver failed to load. Either a file in the .\iosubsys subdirectory is corrupt or the system is low on memory. System halted.
- While initializing device IOS. Error: Real mode system memory allocation failed. System halted.
- VFAT Device Initialization Failed. A device or resource required by VFAT is not present or is unavailable. VFAT cannot continue loading. System Halted.

**Solution:**

1. Hold down CTRL while restarting the computer.
2. From the Startup menu, select Safe Mode and press ENTER.
3. Click the Start button, Run, type **msconfig**, and click OK.
4. In the General tab, click Advanced, Limit Memory To, then increase the amount of RAM.
5. If you unselect the box entirely, Windows will use all available memory.

### Error Message: Parity Error



**Cause 1:** Faulty Memory: This message refers to parity memory. Memory modules are usually available in two types: parity and non-parity. Non-parity memory contains one bit of memory for every bit of data stored. Eight bits store each byte of data. Parity memory adds one extra bit for every eight bits of data. This extra bit is used only for error detection and correction, which means nine bits of data store each byte.

If error-detecting memory detects a defective chip, it might bring up this Parity Error message.

**Solution 1:** To determine whether your computer has defective memory chips, isolate certain chips to limit the amount of memory Windows uses.

# BIOSes

## Change Your Settings For A Quick Fix

Every computer has BIOS (Basic Input/Output System) that runs a diagnostic test each time the computer boots up. Before it launches the operating system, the BIOS checks to make sure all the hardware is working. It then works with the computer's hardware components with the operating system.

The BIOS is stored in a ROM chip that is on your motherboard. PCs built in the past couple of years use **flash BIOS**, which means the BIOS is on a flash ROM chip. These chips are more easily updated than regular ROM chips. ROM is an ideal place for the BIOS because it is on a safe place on the motherboard where it is not vulnerable to drive failures. However, because ROM is slower than RAM, newer computers copy the BIOS from ROM to RAM during the startup process. This process is called **shadowing**, and it improves the performance of your PC.

The diagnostic test that the BIOS performs is a **POST (power on self test)** for the keyboard, drives, ports, chips, and all other components in the system to make sure they are working correctly. You can see and hear the BIOS performing this POST during your system's startup process. One long beep means the BIOS successfully completed all the hardware tests. A combination of shorter beeps indicates a number of different errors. (See the Common Error Messages section for more information.) A healthy system BIOS will display information about the computer, including the amount of RAM, the number of drives, and the type of processor. If the BIOS detects a hardware problem, it will halt and display a text error messages on-screen. When this happens, you need to know how to fix or adjust your BIOS.

■ **Time For A Change.** When you have a BIOS problem, you will probably need to make changes in your BIOS' settings. Even though this is easy and takes only a few minutes, making the wrong change can wreak havoc on your system. A problematic setting could prevent your computer from rebooting. Be very cautious and change nothing that isn't necessary.

To change your BIOS settings, you must enter the computer's CMOS (complementary metal-oxide semiconductor) setup screen during the startup process. CMOS is a small chip that stores information about your particular system and its devices.

To find the CMOS setup screen, reboot your computer. Start by pressing a certain keyboard combination during startup. You should see a line of text at the bottom of the display that tells you which key or keys you need to press to enter the CMOS or Setup area. (*NOTE: You may have to completely shut down your system and turn it back on to see what this key combination is.*) Most systems use ESC, DELETE, F1, F2, CTRL-ESC, or CTRL-ALT-ESC. If the screen doesn't indicate which keys to press, the computer's documentation should do so.

The screen will display several menus, each with rows and columns displaying options for changing dozens of settings. The wording is different according to each system and BIOS manufacturer. Here are some common settings and their definitions, although the names might be different in your CMOS:

- **System Time/Date:** Lets you change the time and date displayed in the lower right corner of Windows.
- **Security or Password Protection:** Lets you set a password for accessing the computer. Because Windows' password screen is easy to avoid (you can press ESC or click Cancel), this BIOS option provides tighter security and requires you to enter the password before the system ever boots. Be sure to write down your new password because if you forget, it will take a great deal of work to access your computer again. (See the "Password Pains" sidebar for information on what to do if you do forget this password.)
- **Enable Number Lock:** This setting is essential for anyone who uses the numbers on the 10-key section on the far right of the keyboard. However, if you don't use the number pad, and you don't like the little green light that comes on every time you boot up—the one that tells you the number lock is enabled—turn off this setting. (*NOTE: You might find this option under the Start Options category.*)
- **Memory:** Because BIOS is on a relatively slow ROM chip, this setting lets you direct BIOS to shadow with RAM or a different memory source. (*NOTE: You might find this option under the Advanced Setup category.*)
- **Boot Sequence:** This setting determines the order in which the BIOS reads drives in search of startup instructions. The BIOS traditionally begins with the hard drive. Change this setting to boot your machine from a CD-ROM or Zip disk when you reinstall the OS or use a boot diskette.
- **Exit:** When you are ready to leave CMOS, you will have the options of saving the changes, discarding the changes, or restoring the system default settings. If you made changes, your computer will restart to put the new settings into effect. If you suspect that you've made a problematic change, exit without saving.

■ **Upgrade.** Newer computers rarely, if ever, need to have their BIOSes upgraded to work with new equipment. Both software and hardware upgrades typically come with drivers, software you install so the devices can work

with your computer. Older computers, on the other hand, might need a BIOS upgrade to understand new hardware and software installed on the system. An upgrade will also have the ability to correct newly detected bugs.

To upgrade an old BIOS, start by reading the screen during startup and looking for the name of the BIOS manufacturer. If you don't see the name of your manufacturer, go into the CMOS setup (see the above instructions). The very top of the CMOS screen should identify the BIOS maker. The largest manufacturers are Acer Labs, AMI (American Megatrends), Microid Research (Mr. BIOS), Phoenix Technologies, and Winbond.

You can also determine the manufacturer in Windows. In Windows 98 and Me, click the Start button, Programs, Accessories, System Tools, and then System Information. At the top of the left column, click System Summary. Then, you should see the BIOS Version line.

Next, find the version number of your present BIOS (if you can). This is a long string of digits and letters that flashes at the top of the screen during the first moments of start up. Press the PAUSE key to freeze the screen while you record the number. If you can find it, go back to the CMOS setup and find the BIOS date.

Go to the BIOS manufacturer's Web site and find a BIOS upgrade program for your system. Look under a link called Free Downloads or Technical Support, then follow the instructions specific to your model PC. Upgrading BIOS can backfire if you install a version that is not compatible with your system. Thus, upgrade only when you are sure it is necessary and then do so carefully, double-checking that you are downloading the proper update. You may want to contact technical support before you install the file.

Copy the program, including the update and utility, onto a diskette. Restart the computer with the diskette in the drive. The program should erase the old BIOS settings and install new ones. In addition, follow any manufacturer instructions for installing the software.

■ **Fix.** If you've tried troubleshooting a piece of hardware to no avail, the problem might be hidden in your BIOS settings. To find out, enter CMOS by pressing the correct keyboard combination during the startup process, as described above. Try these steps to correct poorly set BIOS. (*NOTE: The names for each setting might be different in your CMOS and/or you may not have some of these settings.*)

**The system is not detecting a new drive.** Go to a CMOS setting called Drive Configuration, Hard Disk Settings, or even Devices And I/O Ports. It lets you configure the hard drives,

## Password Pains

Many users take advantage of the extra security settings offered in the BIOS (Basic Input/Output System). Although a computer thief or unscrupulous co-worker could easily get past your Windows password, he would have infinitely more difficulty cracking a password set in the BIOS. The downside to having this higher level of security is you will lock out yourself if you forget your password.

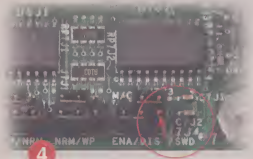
A CMOS (complementary metal-oxide semiconductor)-set password will cause the system to prompt you for the password during every startup, before it launches the operating system. If you lose your password or it suddenly does not work, you could have a big problem.

**1.** The first thing to do is to try to find a default or backdoor password that works with your brand of BIOS. Most major BIOS manufacturers program their chips to work with certain words as a password. Try typing the name of the manufacturer in as your password. For example, your might try "AMI," "Award," or "Mr Bios." Some manufacturers set the default password to be a common word such as, "bios," "setup," "cmos," "password," "sw," "SW," or "BIOSTAR."

**2.** If those don't work, contact the maker of your PC, motherboard, and BIOS to ask whether a default password exists. If so, they should reveal it to you when you provide a receipt to show you own the PC.

**3.** If the manufacturer will not help, you must open up the case and make physical changes to the motherboard. Always unplug the computer and ground yourself by touching metal.

**4.** The motherboard manual might list a jumper that clears the present CMOS password. If this is the case, just reset the jumper and boot up your personal computer.



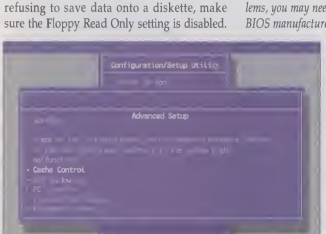

**5.** If your motherboard lacks this setting, you probably have to use a different motherboard jumper that resets the entire contents of the CMOS program. Find a jumper that has three pins adjacent to the battery. Reset CMOS by moving the jumper from 1-2 to 2-3, or from 2-3 to 1-2. If you had gone into CMOS and manually configured the date, time, disk drive detection, and other settings, you'll have to do that all over again once you can get into your computer.

**6.** If your motherboard has no reset jumper whatsoever, your last resort is to erase the BIOS settings by physically pulling the CMOS battery off the motherboard. It's a small, round battery, usually sitting near the power connector. Remove it from the board and keep it off for several hours because it takes that long for the charge to drain out of the CMOS circuits.

**7.** If your CMOS battery is soldered down to the motherboard, you should probably have a technician replace it. ☐

CD-ROM drives, and diskette drives. PCs made in the past few years come with an automatic-detection program that enters configuration data into CMOS. If your system is older than that, or if you installed a drive your system is not detecting, enter the drive information manually to prompt your system to detect it. You do this in CMOS, where your drive information is located. This area is often called Drive Configuration, Hard Disk Settings, or something along those lines. There will be an option where you can choose between manual detection and automatic detection.

**Diskette drive problems.** If you are encountering mysterious diskette drive problems, go into the Diskette Disk or Devices And I/O Ports settings. Make sure it shows the type of drive in your A and B ports. For example, if your port has a drive for a 3.5-inch diskette or a 1.44MB diskette, the BIOS setting should reflect that information. If your computer is refusing to save data onto a diskette, make sure the Floppy Read Only setting is disabled.




**Be very careful once you enter the CMOS setup screen and start making changes. Incorrect settings could prevent the computer from rebooting.**

This setting prevents you from writing data to a diskette.

**Trouble installing a mouse.** If you've plugged in a mouse or other serial device and it is not responding, go to Serial Port Settings. This setting might have the port turned off or labeled as Disabled.

**Printer woes.** A new printer that is running slowly or refuses to work at all might be the victim of the wrong mode setting of its parallel port. Find a group of settings called Parallel Port or Parallel Port Setup. They will give you choice of four modes that determine the speed and transmission capabilities of the parallel-port connection: standard, bi-directional, ECP (extended capabilities port), or EPP (enhanced parallel port). Printers made several years ago use the slower, standard mode and may not work if plugged into a port set to a fast mode. Similarly, new printers may not function unless you set their ports to ECP.

■ **Common Error Messages.** Many other common BIOS problems will probably disturb your PC at one time or another. Many of these quirks will happen during the startup process. If the BIOS detects a difficulty during startup, the screen will display an error message or the system speaker will emit a combination of beeps to help you narrow down the irregularity. The computer's documentation and BIOS manufacturer's Web site should list dozens of codes and their meanings. Here, we translate common beep codes and error messages, although they may not be the same for your system. (*NOTE: To fix any of these problems, you may need to check with your computer's BIOS manufacturer.*)

**CMOS Checksum Error**—BIOS thinks a virus, dying battery, or other anomaly has changed a CMOS setting without your knowledge. This can happen when you flash the BIOS. Go into CMOS, restore the old settings, and reboot the computer. If the error does not recur, run an antivirus program just in case a bug has changed the CMOS settings. If the error does recur, replace the battery. This battery is important because it keeps the BIOS safe from power outages. Just open up the case and replace the battery. Don't worry about losing information; it takes some time before the battery drains. However, you should replace the battery as quickly as possible.

- **Battery State Low**—You don't need to go into CMOS because this error specifies the problem. Open the case and replace the battery.
- **Diskette Drive A Error or Incorrect Drive A Type**—Cables connected to Drive A might be loose. Turn off the computer, ground yourself, open up the case, and tighten cables leading to Drive A. If the message comes back when you reboot, go into CMOS to confirm you have the drive properly configured.
- **Keyboard Error**— There is probably a loose cable between the keyboard and CPU. Tighten every cable and reboot your system. "Keyboard Error NN" indicates a key is stuck.
- **Diskette Boot Failure**—If you're trying to boot up from a diskette, the BIOS thinks the diskette is corrupted or has a virus. Try to boot up another computer with this diskette to learn whether it's truly corrupted or whether your computer is to blame.
- **Display Switch Not Proper**—A video switch (physical circuitry) on the motherboard should be set to color, but it is set to monochrome or vice versa. Turn off the machine, change the switch on the motherboard, and reboot.
- **KB/Interface Error**—The keyboard connector is malfunctioning.
- **FDD Controller Failure**—BIOS cannot communicate with the diskette drive controller.
- **HDD Controller Failure**—BIOS cannot communicate with the hard drive controller.
- **DMA Error**—The Direct Memory Access controller is malfunctioning.
- **One short beep**—There is a problem with the memory refresh circuits on the motherboard.
- **Five short beeps**—The CPU is indicating an error.
- **Eight short beeps**—The video card (also called graphics card or video adapter) is missing, is not responding to the BIOS POST, or has faulty memory.
- **One long and three short beeps**—The monitor or video RAM has failed. If you confirm these devices are functioning properly, check other parts of the video system.

■ **Don't Be Afraid; Be Careful.** If you have a BIOS error or BIOS-related problems, don't be afraid to try to fix the problem. If you ever foul up your system even more, reboot it while holding down the key or keys used to enter setup. This bypasses extended CMOS settings and is the first step in getting your PC up and running again. Once you get to the Setup menu, you can reload the original factory settings by choosing Load Values From CMOS. However, remember that changes you have made to the BIOS since you bought the PC, including adding storage devices, will not be reflected in these values. In addition, sometimes you can make changes that will prevent your system from rebooting again, so just be careful. LS

*by Raya Tahan*

# Ports

## Solve Conflicts & Learn To Enable Devices

If you want to keep your personal computer working properly, you need working ports. The ports on your system, which resemble plug-ins, are usually on the back of your PC. They let data in and out of the computer. Keyboard, PS/2 mouse, serial, parallel, and USB (Universal Serial Bus) ports let your system use a wide variety of devices. You can't type, use your mouse, print, or scan unless these ports are working.

When you have problems with any of your ports, the task of troubleshooting them is difficult for two reasons. First, defective cables or defective devices (at the other end of the cable) can cause problems that appear to be caused by a defective port. Second, for the most part, operating systems lack built-in diagnostics for ports. So, if you want to troubleshoot port problems, you need to use testing methods that ensure you will find port not cable or device problems.

■ **Serial & Parallel Ports.** Serial (also called COM [communications] ports) and parallel (also called LPT [line printer terminal]) ports sometimes have IRQ (interrupt request lines) conflicts with devices, such as modems or network cards, because these ports don't share IRQs with other devices. (**IRQs** are communications routes within a computer that are for carrying interrupt signals; they tell the CPU to halt its present task and await further instructions.)

To troubleshoot serial and parallel ports, begin by opening the Windows Device Manager. Click the plus sign (+) next to Ports (COM & LPT). You will see a list of the present serial and parallel ports installed on your system. If any of the ports have a yellow exclamation point icon, this indicates a configuration problem with the port. If any of the ports have a red "X," the port is disabled.

If you see an exclamation point, click the port and then Properties to determine the problem. On the General tab of the port's properties dialog box, the Device Status area indicates any problems that exist with the device. If you have a driver problem, click the Driver tab and click Update Drivers to install new drivers. If a conflict is the problem, click the Resources tab and look at the conflicting devices list. Devices using the same IRQ or other settings as the serial or parallel port are in this list. Because serial or parallel ports can use only a few settings, try to change the other device's conflicting settings. If the device is disabled, as indicated by a red "X" next to the device, click Enable Device. Restart the computer if directed, and try to use the port again. (*NOTE: Because serial and parallel ports are built into the motherboard, you may need to use the system BIOS [Basic Input/Output System] configuration utility to change the port configuration or enable the port. Check your system manual to learn what key or keys to press at system startup time to access the setup program and what menu item to choose to adjust port settings.*)

If no driver or conflict problems appear, but you cannot use the serial or parallel port, the port may not be properly connected to the motherboard. Baby-AT motherboards use ribbon cables to carry serial and parallel signals to the rear of the computer. If you do not have these ribbon cables connected to the motherboard properly, the port will not work. To check these cables, turn off the system, unplug it, and open the case. Make sure you properly attach each cable to the motherboard. You should have a colored stripe on each cable aligned with pin 1 on the motherboard. (See your system or motherboard manual for more information.)

If the port has no driver or conflict problem and is properly connected to the motherboard but the devices connected to the port still don't work, you should test the port to determine if it's working.

If you have performed the troubleshooting checks above, and you still can't use devices attached to a serial or parallel port, you must make sure the port is at fault and not the devices or cables attached to it.

**Serial port tests with Windows Modem Diagnostics.** For serial ports, start troubleshooting using the Windows Modem Diagnostics tool. This diagnostics test will check serial ports, even if the port doesn't have a modem installed. To begin, click the Start menu, select Settings, and choose Control Panel. Double-click the Modems icon. Click the Diagnostics tab. Click the Serial port you want to test and click the More Info button.

If the port lists an external modem, you may see an error indicating the modem is not on. If you have disconnected the modem or the modem is not on, this is normal. Click OK.

The Port name, Interrupt (IRQ), Address (I/O [Input/Output] port address), and **UART chip** (a **universal asynchronous**

receiver-transmitter chip at the heart of all true serial ports) should be listed. If you get a Can't Open Port error, the serial port may be disabled or defective.

This test indicates the port is working correctly internally. To determine if the external port connector is working, you could use a working serial mouse or printer, or you could use a loopback plug, which we will describe later.

**Serial port tests with a mouse.** To test the serial port if you use a PS/2 mouse rather than serial mouse, begin by shutting down the system and removing PS/2 mouse. Then, start the computer and wait for Windows to indicate that there is no mouse connected to the system. Connect a working mouse to a serial port and press ENTER to tell Windows a mouse is present.

If the serial mouse functions, the serial port works (most serial mice use the same Windows driver as PS/2 mice). Repeat this process to test additional serial ports. (*NOTE: Make sure you use a serial mouse or a PS/2 mouse with an adapter made for it. Don't try to use an adapter on a PS/2 mouse shipped with a computer because these mice aren't designed to work with a PS/2 to serial port adapter.*)

## PS/2 Mouse Port Test

A common port you might have problems with is your mouse port. Follow these simple steps to troubleshoot this port.

**1.** Make sure you have your PS/2 mouse plugged into the mouse port, not the keyboard port. Both use the same 6-pin mini-DIN connector, but these ports are not interchangeable. If you plug your mouse and keyboard into the wrong ports, neither will work.

Windows displays a No Mouse Found error message, the mouse port is probably disabled. On some systems, you can use a motherboard jumper block to enable or disable this port. On other systems, you can use a BIOS (Basic Input/Output System) setup option to enable or disable the port. Check your system manual for details.

**4.** If the port is disabled, enable the port and restart your computer

**2.** If the keyboard is working, it's in the correct port. The other port is for the PS/2 mouse. Do you have your PS/2 mouse plugged in tightly? If not, shut down your system, reattach the mouse, and restart your computer.

**3.** Watch for the mouse pointer as the system displays the Windows Desktop. If you don't see a mouse pointer or if with the mouse attached to the port. Again, watch for the mouse pointer to appear when the Windows Desktop appears. If the mouse pointer appears but does not move as you move the mouse around, the mouse port is probably defective. If you still don't see a mouse pointer, you or someone else may have disabled it using the Windows Device Manager.

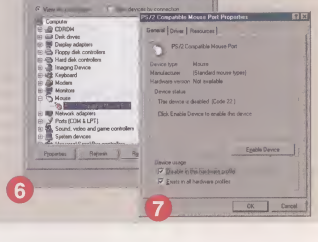
**5.** To access the Windows Device Manager without a mouse, press CTRL-ESC to open the Start menu. Use the Up arrow key to highlight Settings, then use the Right arrow key to highlight the Control Panel option. Press the ENTER key. Use the arrow keys to highlight System and press ENTER again. Use the arrow keys to highlight the Device Manager tab.

**6.** If you see a red "X" (indicating a disabled device) next to your mouse, press TAB twice to move the dotted-line highlight around the Computer option on the Device Manager. Then, use the down arrow key to move to your mouse. When it is highlighted, press TAB and then ENTER to open the properties dialog box for your mouse.

**7.** If the Disable In This Hardware Profile box has a check mark, remove the check. This will enable the mouse. To do this without a working mouse, highlight this text using the arrow keys and then press the Spacebar to clear the checkbox. Use the TAB key to highlight OK and press ENTER. You will then need to restart your system.

**8.** If you restart the system and the mouse pointer appears but does not move, make sure the PS/2 mouse port on the rear of the computer is properly attached to the motherboard if your system uses a Baby-AT motherboard. (See the main article for details.)

**9.** If the PS/2 mouse port is properly wired to the external port or if it is built in to the rear of the motherboard and the mouse still won't work, the port is defective. ☐



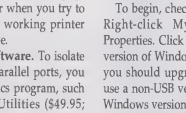
**Parallel port test with a printer.** Testing the parallel port is a bit more complicated than testing a serial port; you must attach a working printer and parallel printer cable to the port. You should use a printer that does not require Windows drivers to work.

To begin, use the Windows 98 emergency boot diskette to start the system. When the system finishes booting, type **dir>lpt1** and press ENTER to send a listing of files on the boot drive to the printer attached to LPT1.

If you have attached an inkjet or dot matrix printer, the printer should immediately print out the files on the boot diskette. If you attach a laser printer, the printer's data light will come on and you may need to eject the page manually. If you get an error when you try to print the file listing with a working printer and cable, the port is defective.

**Third-party testing software.** To isolate problems with serial and parallel ports, you may want to try a diagnostics program, such as SmithMicro's CheckIt Utilities ($49.95; 949/362-5800; http://www.smithmicro.com).

CheckIt Utilities includes **loopback plugs** to allow for more accurate testing. Loopback plugs resemble the connector at the end of a serial or parallel cable. The name comes from the internal wiring, which sends transmit lines back to receive lines.


Windows Mouse Support
Windows did not detect a mouse attached to the computer. You can safely attach a serial mouse now.
To attach a mouse to a PS/2 mouse port, you must first turn the computer off.
Do not show this message in the future.
OK

**Windows 98 displays this error message when it does not detect a mouse; if your mouse is plugged into a PS/2 port, and you receive this message, it may indicate the port is disabled.**

To use a loopback plug to test a serial or parallel port, do the following:

1. Turn off the computer and any device attached to the port you want to test.
2. Remove any device attached to the port.
3. Attach the loopback plug to the port.
4. Restart the computer and run the diagnostics program.
5. Select the serial port or parallel port test.
6. Select the external loopback test option.

When you attach a loopback plug to a port and the diagnostic program sends data out of the port, the loopback plug immediately sends the data back if the port is working correctly.

■ **USB Ports.** Another type of port for which you might encounter problems is USB. These ports work only under certain conditions. First, your USB port must be enabled in the system BIOS. Second, your computer must be running a version of Windows that supports USB ports fully, such as Windows 98, Windows Me, or Windows 2000. Even though late OEM (original equipment manufacturer) versions of Windows 95 (versions supplied with computers and not available at retail) had early forms of USB support, most USB devices don't work with Win95. Third, you need USB device drivers for your device and operating system. Win2000 uses different drivers than Win98 or WinMe, and some devices that work in Win98 and WinMe will not work with Win2000 because of a lack of drivers.

**New USB device.** If you have never used the USB ports on your system before, and Windows does not detect your new USB device, follow this procedure:

To begin, check your version of Windows. Right-click My Computer and select Properties. Click the General tab; it lists your version of Windows. If your version is Win95, you should upgrade to Win98 or WinMe or use a non-USB version of your device. If your Windows version is Win98 or WinMe, click the Device Manager tab.

The Device Manager lists various hardware categories. At the bottom of the list, find the Universal Serial Bus Controllers (the official name for USB) category. If you have the category, any devices with problems or disabled devices will display. (If you don't have any problems, you will need to click the plus sign (+) next to the category to view all the devices in it.) If the universal host controller or USB root hub have problems or are disabled, no USB devices attached to your system will work.

Click any USB device that has been disabled or has a problem and click the Properties button. Use the procedure listed earlier for serial and parallel ports to resolve any problems. Restart the computer if prompted after making changes to conflicting devices or if you enable the port.

If the USB controller is not visible in the Device Manager, it has been disabled in the system BIOS. Close Windows, restart your computer, and press the appropriate key(s) for your system to start its BIOS setup program. Enable the USB ports and restart the computer.

Windows should now recognize your USB ports. However, you may need to provide your Windows CD-ROM to install the USB drivers. Reboot the computer if prompted. On your next reboot, Windows should recognize your USB device. Insert the driver diskette or CD-ROM as prompted to finish the job.

**Old USB device.** If your USB ports have worked but are no longer working, you will need to perform a few more steps. To begin, check your cables. Loose USB cables at either the computer or device end will prevent USB devices from working. If one of your cables is loose, you can just remove it and reinsert it to retry your device. You can do this because USB supports **hot swapping**, which is the ability to replace a computer component while the computer is on.

If you still haven't solved the problem, reinstall the drivers for your USB device; sometimes USB device drivers are damaged, and they won't work correctly. You might be able to use the Drivers tab in the Device Manager properties for your device, or you may need to rerun a setup program to fix the problem. (*NOTE: You can download and install updated drivers from the Web site of manufacturer of the device.*)

■ **Other Resources.** If you still haven't solved your problem using our simple instructions, contact the manufacturer of the device you are having problems with or the manufacturer of your PC. LS

*by Mark Edward Soper*

## Solve Keyboard Quandaries

Troubleshooting the keyboard port is easier than with other devices because the system **BIOS** (**Basic Input/Output System**; software that controls the startup process of your system) checks the keyboard (and thus the port) every time you start up your system. First, turn on the computer and watch for keyboard error messages at startup. If you see a keyboard error, turn off the system. Then, unplug the keyboard and plug in a known-working keyboard. Restart the system and watch for keyboard error messages again. If the same error occurs, the keyboard port is defective. If this is the case, you probably will need to replace the motherboard because the keyboard port is built into the motherboard, and you cannot replace it just by inserting an add-on card. □

# Power Supplies

## Get Your Energy Back

The term "power supply" is a misnomer honored by long usage. The computer's power supply really is a power converter; it changes dangerous high-voltage AC (alternating current) into safe low-voltage DC (direct current) for use by your system's fans, CPU, memory, motherboard, and peripheral devices, such as keyboards and mice.

When the power supply stops working, so does your system. There are two main reasons for a power supply to stop. First, you really could have a power supply failure. Second, your power supply could be reacting to an outside problem. So how do you determine what is happening with your system? Keep reading.

■ **When Nothing Happens.** When you turn on the computer, you expect your system to make a low humming noise, display some signal lights, put text on the monitor, and, after a couple of minutes of starting up, let you get to work. If nothing happens when you turn on your system, you'll probably have a sinking feeling in your stomach, but you don't need to panic. You may be able to find a simple solution to your problem.

When you have a dead system, use the following game plan:

1. Make sure you eliminate obvious problems that will prevent your system from getting power in the first place.
2. Check the input voltage.
3. Check for shorts inside the system.
4. Test the power supply itself.
5. Swap power supplies if a working spare is available.

This five-part game plan will get your system up and running as quickly as possible. The following explains the tasks you need to complete in each step.

### 1 Eliminate The Obvious.

If you turn your computer on and nothing happens, your first step is to make sure that power is actually reaching the computer. Check the outlet the computer is plugged into to make sure you haven't lost power or have a loose plug. Check the surge protector to make sure you have your power cord plugged into it and the surge protector is on. Then, check the power supply cord running to the rear of your PC. If any of these cords are loose, you probably won't be able to start your PC.

Next, make sure you turned on your system the right way. Today's computers use a different kind of power supply than systems made a few years ago. With older systems made before 1996, you could leave the power switch on the computer in the on position and control your computer with a surge protector, using its power switch to start your computer, monitor, printer, scanner, and other devices all at the same time. That no longer works with recent systems; they use a different kind of power supply that receives its startup and shutdown signals through the motherboard rather than from a switch mounted on or wired to the power supply. With these systems, after you turn on the surge protector, you need to push the case-mounted switch to send the signal to the power supply to start.

### 2 Check For Incorrect Input Voltage.

Next, you need to find the slider switch on the back of your power supply. Most PCs have this switch, and it lets you select the input voltage. When the power supply is set to use an input voltage higher than the actual voltage used by the system, you might see a momentary flash from the LEDs (light-emitting diodes) on the keyboard and the fan might quiver, but that is all.

**Testing the voltage on a power supply is easy. Here, we are testing the #10 wire (+12 volts), which is yellow, on a 20-pin ATX power supply.**

Take a moment to see if somebody has played a trick on you by setting your computer to use the wrong voltage. Move to the rear of your system and look for a small sliding switch near the power supply fan. Make sure you have it set to your local AC voltage (115 volts AC in North America). Change it to the correct value if you need to and restart your system.

Setting the input voltage to 230 volts with 115

volts as the incoming power is a harmless prank, but leaving a North American computer set to 115 volts and plugging it into 230-volt power will destroy the power supply and possibly other components. Always leave the power supply set to the correct input voltage.

### 3 Find Dead Shorts.

Your next step is to determine if you have a dead short. The DC voltage (converted from AC by your power supply) is transmitted to the motherboard and to your hard drive, diskette drive, removable media, and optical drives. If two of your power leads are crossed, you'll have a **dead short**, which is a short circuit that causes the power supply to immediately shut down your system.

The following are some typical causes of dead shorts inside your system:

- loose screws—If you drop a screw inside a system while attaching a drive or card, turn the system upside down until the loose screw falls out. A loose screw will eventually cause a dead short.
- bare wires—A poorly-constructed Y-splitter used to divide a single drive power connector into two leads may expose some bare wire; move the Y-splitter until the bare wires touch and down goes your power. A good way to figure out if your Y-splitters are causing power supply shutdowns is to remove them from a dead system. If the system runs

**You should have your voltage switch on the back of your personal computer set for 115 volts of AC (alternating current) if you are in North America.**

## Check Motherboard & Slot Voltages

An easy way to check the voltages of your motherboard is to check slot voltages. You'll need a digital multimeter with a DC (direct current) voltage setting to perform these tests. We used one of Radio Shack's low-cost, pocket-sized Microntas for our multimeter.

**1.** Turn off the computer and unplug it.

**2.** Open the computer case and locate the power supply connection to the motherboard.

**3.** Locate an ISA (Industry Standard Architecture) slot. A 16-bit ISA slot has one long and short black edge card connector starting at the back of the computer's motherboard. An 8-bit ISA slot has only one long connector. PCI slots are shorter than the long ISA slot and offset toward the middle of the motherboard, away from the back edge. Usually you will find PCI and ISA slots mixed among each other on the board.

**4.** Locate connector B3 (the third tooth from the rear on the left).

**5.** Turn on the system.

**6.** Turn on multimeter and set it to DC voltage.

**7.** Insert the red lead from the multimeter into connector B3.

**8.** Touch the black lead to the power supply case to create a ground.

**9.** Compare the value you receive to the "Connector Values" chart.

**10.** Repeat steps 7 to 9 for connectors B5, B7, and B9; if any of these values fall beyond the limits below, your power supply may be defective. If the values are off, go to step 11. If the values are normal, go to step 12.

**11.** Remove any cards in slots and repeat steps 7 to 9 for all connectors: B3, B5, B7, and B9.

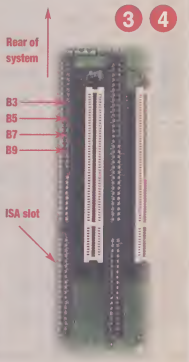
**12.** Insert red lead into top of the Power Good connector. On a 12-pin connector, Power Good is the orange cable at the opposite end from the three red cables. On a 20-pin motherboard connector, Power Good is the gray wire at connector #8. Power Good is rated at +5 volts. The acceptable level is between +3.0 and +6.0 volts.

**13.** Replace your power supply if your values in step 11 or step 13 fall beyond their limits. □

### Connector Values

When you test the connectors in your ISA (Industry Standard Architecture) slots, they need to fall within a certain voltage area. If they don't, you probably need to replace your power supply.

| Connector | Rated (in volts) | Acceptable Rating (in volts) |
|---|---|---|
| B3 | +5 | +4.8 to +5.2 |
| B5 | -5 | -4.5 to -5.4 |
| B7 | -12 | -10.8 to -12.9 |
| B9 | +12 | +11.5 to +12.6 |



correctly without them, throw out the ones you removed and buy good ones; check them for bare wires and shoddy assembly. Other sources of bare wires include damage to power or ribbon cables (which also carry power); if you see damaged cables, replace them.

- **damaged hardware**—Damaged hardware such as add-on cards or drives can cause dead shorts. To find out if your cards or drives are to blame for dead shorts, remove one card at a time from your system and restart the system. As soon as you find a bad card, the system will start. If the cards aren't to blame, disconnect one drive at a time and restart the system. As soon as you disconnect a bad drive, the system will start.

| | | | | | | |
|---|---|---|---|---|---|---|
| +3.3v | Orange | 11 | | 1 | Orange | +3.3v |
| -12v | Blue | 12 | | 2 | Orange | +3.3v |
| Ground | Black | 13 | | 3 | Black | Ground |
| PS-On | Green | 14 | | 4 | Red | +5v |
| Ground | Black | 15 | | 5 | Black | Ground |
| Ground | Black | 16 | | 6 | Red | +5v |
| Ground | Black | 17 | | 7 | Black | Ground |
| -5v | White | 18 | | 8 | Gray | Power Good |
| +5v | Red | 19 | | 9 | Purple | +5v Standby |
| +5v | Red | 20 | | 10 | Yellow | +12v |

**Figure 1: This is the color-coding for the 20-pin (ATX) power supply used on most personal computers. Your voltage levels should be within 5% to 10% of the rated values above. Use the shapes of the above sockets to key the connector.**

## 4 Check The Voltage.

If you don't find any sources of dead shorts or the system tries to work but seems erratic in operation, it's time to use a **digital multimeter** to test voltage levels on the motherboard. You can check at least four voltage levels on your motherboard: +5, -5, +12, and -12 volts. On power supplies that use the 20-pin ATX connector, you also can check the +3.3 volts.

*(NOTE: See figures 1 and 2 for connector color-coding to see which wire colors go with which voltage levels. Use the values listed in the sidebar for motherboard connectors B3 through B9 for acceptable voltage levels. If you have a 20-pin power supply and decide to test the +3.3 volts DC lead, a value between +3.135 volts and +3.465 volts DC is acceptable.)*

You should test these voltage levels at the power connector(s) that attach to the motherboard, and, if possible, at a motherboard expansion slot (see sidebar for details). For example, to test for +5 volts DC power at the power supply connector, follow this four-step procedure:

1. Make sure your PC is off and open its case. Turn on your digital multimeter, and set it to DC power. Turn the PC on.
2. The red wires extending from the power supply to the motherboard carry +5 volts DC power. You can test any of these leads.
3. Carefully push the red lead from the multimeter through the top of the power connector alongside at any of these red wires; make sure the end of the lead touches the metal inside the power connector
4. Carefully hold the black lead from the multimeter against the power supply's case to create a circuit and check the measurement on the multimeter's display; it should read between +4.8 volts and +5.2 volts of DC.

If you get acceptable voltage readings when you check the power leads to the motherboard, but no power or unacceptable voltage readings when you check the power at expansion slots, the motherboard is defective. *(NOTE: Before you perform any of these tests read the manual for your multimeter.)*

**P8**

| | | |
|---|---|---|
| 1 | Orange | +5v (Power Good) |
| 2 | Red | +5v |
| 3 | Yellow | +12v |
| 4 | Blue | -12v |
| 5 | Black | Ground |
| 6 | Black | Ground |

**P9**

| | | |
|---|---|---|
| 1 | Black | Ground |
| 2 | Black | Ground |
| 3 | White | -5v |
| 4 | Red | +5v |
| 5 | Red | +5v |
| 6 | Red | +5v |

**Figure 2: The color-coding for the 12-pin (LPX/Baby-AT) power supply used on PCs through 1996. Note that there are two 6-pin plugs labeled P8 and P9, and the black wires of each meet in the middle.**

## 5 Swap Power Supplies.

If you are still unsure of the cause of your problem, you can exchange the power supply for a working model and try your tests again. You may need to remove the old power supply from the case and attach a new one in its place. If you do, make sure the new power supply has the same or higher wattage rating, the same power connectors, and the same form factor (fits in the same case) as the old one. Usually, you'll find the solution long before you need to perform this kind of surgery. LS

*by Mark Edward Soper*

# Hard Drives

## Tackle Present & Potential Obstacles That Plague Your System

Once upon a time, hard drives were a problematic component of the PC. Users who wanted to upgrade an existing drive or add a new drive to their systems had to deal with jumper configurations, BIOS (Basic Input/Output System) settings,and boot options. Dealing with a troublesome hard drive was a real pain, and one we didn't encourage.

Boy, how things have changed.

Today, hard drives are a snap to install. And they're just as easy to troubleshoot. It's unlikely you'll ever have to do that, though. Most of the problems that users blame on the hard drive are actually caused by the OS (operating system), viruses, or some other software-related cause. That's not to say you can put a hard drive in your computer and forget about it. Certain situations, such as those described below, require you to give it some attention.

**Situation:** The drive performs sluggishly.

**Resolution:** Sluggish performance is the result of common drive-related problems, such as fragmentation, drive errors, cross-linked files, and lost clusters. What causes these problems? Not the drive, but the OS. Indeed, drive maintenance is actually a process of correcting the errors that crop up in the course of the OS's daily interaction with the storage device. Unfortunately, the Windows OS is prone to errors in this regard, so you have to perform these corrective actions quite often.

**Delete unnecessary data.** When your drive is low on space, strange things happen. Disk fragmentation becomes more pronounced, for instance, and **virtual memory** (an area on the hard drive that serves as an overflow for system memory) doesn't work right. To minimize the likelihood of such problems, you should keep the hard drive clean of unnecessary data files, including temporary files, cached Internet files, and downloaded program files. The easiest way to eliminate these files is to use the Disk Cleanup utility, which comes with Windows 98, Windows Me, and Windows 2000. This utility lets you designate which files you want deleted, and then it searches them out and eliminates them. You can access this utility by opening the Start menu and selecting Programs, Accessories, and System Tools.

**Scan for drive errors.** Drive errors are minor problems that affect a tiny area of the hard drive, preventing the storage of data in that particular location. They can take many forms and most often affect the drive's **sectors** (a location on the drive where data is stored) and **clusters** (a group of related sectors). Some of the most common drive errors are **bad sectors** (sectors that cannot hold data), **lost clusters** (clusters that the hard drive believes to be in use, but aren't), and **cross-linked files** (two or more files that try to use a single cluster). Fortunately, all of these problems can be identified and fixed with one simple action: run ScanDisk. You'll find ScanDisk by clicking Start, Programs, Accessories, and System Tools.

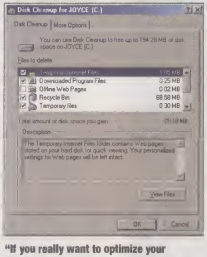
ScanDisk finds drive errors and fixes them. If it identifies some lost clusters, for instance, it marks them as available for holding data. By dealing with these minor errors before they cause a drive crash, ScanDisk helps you avoid future troubleshooting endeavors. After ScanDisk fixes an error, it allocates any unsaved data it finds to a file fragment. You can view these file fragments, which bear the .CHK file extension, in a text editor such as Windows' WordPad or Notepad. The file fragments can be difficult to read, as they're often punctuated throughout with nonsense characters, but you can salvage much of the data contained within them if it's important enough to you.

**Defragmenting the fragments.** The final step in maintaining good drive health is drive defragmentation. This is essentially the process

of organizing data on the drive. We'll explain how it works.

Data on the drive is stored in small pieces, called **fragments**, and these fragments are situated on the drive by the OS. Under ideal circumstances, the fragments are situated in a manner that allows for efficient retrieval by the OS. As you add new data and delete old data, however, things get a little messy. Basically, the fragments end up scattered all across the drive. Such **fragmentation**, as it's called, causes drive performance to suffer because it becomes more time-consuming for the OS to locate and retrieve data on the drive.

To solve the problem, you need to run Disk Defragmenter. This handy maintenance tool reorganizes the data on the drive and marks off any bad sectors it encounters. You can access Disk Defragmenter from System Tools on the Start menu. Run the utility at least once every six months, and more often if you add and delete numerous files from the hard drive.


Disk Cleanup for JOYCE (C:)
Disk Cleanup
More Options
You can use Disk Cleanup to free up to 194.29 MB of disk space on JOYCE (C:).
Files to delete:
Downloaded Program Files 0.25 MB
Offline Web Pages 0.02 MB
Recycle Bin 68.98 MB
Temporary files 0.30 MB
Total amount of disk space you gain: 75.18 MB
Description
Temporary Internet Files folder contains Web pages stored on your hard disk for quick viewing. Your personalized settings for Web pages will be left intact.
View Files
OK
Cancel

**"If you really want to optimize your storage," says Pat McGarrah, director of strategic and technical marketing at Quantum, "you should never have the hard drive more than 75% full." We recommend using the Disk Cleanup utility to eliminate unnecessary data and reclaim a little more storage space on your hard drive.**

**Situation:** My hard drive doesn't work and the computer won't recognize it.

**Resolution:** This is the computer user's worst nightmare. Whether it occurs when you first install the drive or after years of use, the loss of a hard drive is a mighty blow to your computer system. Such a problem can have many causes; we'll address the most common.

**Improper installation.** Serious drive troubles are probably going to occur during and immediately after the installation, says Pat McGarrah, the director of strategic and technical marketing for Quantum.

"When you get a computer delivered to you as a bundle, the hardware has already been installed and the software has already been configured by the vendor," McGarrah says. "There's not a lot of work left to do. But when you install a drive yourself, you introduce the potential for a lot of problems."

Those problems include loose or incorrect cable connections, misconfigured jumper settings, and incomplete or buggy software installations. If your drive doesn't work after you install it, the first thing you should do is take a second look at these three things.

The cable connections are actually the easiest thing to correct. First, make sure one of the computer's power cables connects to the matching receptor on the drive. You also need to make sure the data cable was installed properly. The data cable is a ribbon cable that connects to a long, thin receptor on the back of the drive. The other end of the cable connects to an IDE (Integrated Drive Electronics) port on the motherboard. The data cable typically has three receptors on it, and you may need to share the cable with another hard drive or a disk drive. Make sure all connectors fit snugly in the appropriate ports.

Richard Van Dyke, senior manager of product marketing engineering at Maxtor, recommends using the data cable that comes with your new drive rather than recycling the old cable already installed in your PC. "Some people try to use the old cable and that causes problems, such as an unrecognized drive," he says. "Upgrading the cable is a good idea because it ensures the integrity of the data."

*(NOTE: The cable connections described above are relevant for IDE drive installations but not SCSI [Small Computer System Interface] drives. Why not provide information about SCSI drive installations? Because they're quite rare among desktop computer users. The fact is that IDE technology has improved dramatically in the last several years, Van Dyke says. "Most people think for the ultimate in performance, you need a SCSI drive," he says. "That's not true anymore. They think for the ultimate in reliability, you need a SCSI drive. That's not true anymore." As IDE drive technology improves and as external drives, such as those that use IEEE 1394 [FireWire] data connections, become more readily available, SCSI drives may very well vanish from the desktop altogether.)*

Next, you need to double-check the drive's jumper settings. The jumper settings indicate whether the device is the **master** (primary) or **slave** (secondary) device connected to the IDE port. Which jumper settings you use depends on whether the drive is the lone device connected to an IDE port or whether it shares the port with another device. In the former case, the jumper settings should be in the master position. In the latter case, the jumper settings must be opposite the settings of the other devices. For instance, if the other device on the shared port is configured as the master, then the new hard drive must be configured as the slave. Refer to the users' manuals to learn how to check and change the jumper settings for the new hard drive and any other device connected to the IDE port.

Finally, you must ensure that you installed the proper device drivers and **BIOS** (software that controls the hardware startup routines for a PC) updates, both of which should have been integrated into the installation software that came with the new drive. If you think the software is causing a problem, try running it again. Contact the drive manufacturer to obtain a software update if that doesn't work.

We urge you to take advantage of the installation software that comes with your hard drive. This software monitors the status of the drive as you install it and reports any problems that occur. It assists you in resolving trouble spots, including BIOS limitations and device conflicts. The software can also help you format the drive, partition the drive, and port data from one drive to another. The bottom line is that you can avoid problematic installations simply by using the installation software included with your new drive.

**Virus attacks.** A virus that attacks the BIOS, the **boot record** (data that controls the startup of the OS), or the drive's **file system** (the method the OS uses to keep track of files on a storage device) could render the drive inaccessible, perhaps even preventing you from **booting** (starting) your computer. It's common for users who experience this problem, which will occur after the drive has been installed and functioning properly for some time, to assume the drive has gone bad and purchase a new one. Such an upgrade is unnecessary.

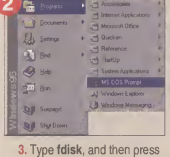
If you experience the sudden inability to access the hard drive, then a virus may be the problem. Contact an antivirus software developer to get a remedy, which will most likely be a diskette that you insert in your computer before booting the computer. When you turn

## Partition It

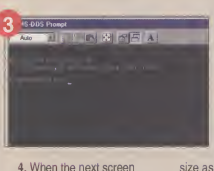
Partitioning can do marvels for a hard drive, including increasing the amount of usable storage space on the drive by as much as two-fold. There are several partitioning tools available on the market, but the one that's readily accessible to most users is FDISK, which comes with every version of Windows. Here, we show you how to use FDISK to create two partitions.

**1.** Before you start, make sure you back up your data on removable media (storage material such as disks, discs, diskettes, and tapes) first. Partitioning the drive will cause you to lose all data saved there.

**2.** Access MS-DOS Prompt from the Start menu.




**3.** Type **fdisk**, and then press ENTER.




**4.** When the next screen appears, press the *Y* key and then ENTER.

**5.** Next, you'll see the *FDISK* Options screen. If you have multiple hard drives installed in your PC, press the *5* key and then ENTER. If you have only one hard drive installed in your PC, skip to step 7.

**6.** The resulting screen gives you the option of selecting which drive you want to partition. Select one of the drives from the list, and press the key that corresponds to the drive. Press ENTER.

**7.** On the FDISK Options screen, press the number 1 key and press ENTER.

**8.** The first thing to do is create a primary partition, so press the 1 key and ENTER. If you're partitioning your only or primary hard drive, this is the partition that will contain your operating system.

**9.** FDISK will verify the integrity of the drive. When it's complete, an on-screen message will ask whether you want to use the maximum available size for a primary partition. Press the *N* key and then ENTER.

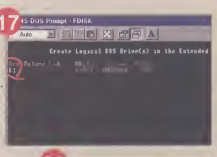
**10.** Once again, FDISK may verify the integrity of the drive. Afterward, it will ask you to specify the size of the partition. We recommend entering the size as a percentage instead of a specific byte-capacity. To create a primary partition that is 50% of the drive, type **50%** and press ENTER.

**11.** A verification screen will indicate that the partition has been created. Press the ESC key to continue. On the resulting screen, press the 1 key and ENTER.

**12.** Press the 2 key and ENTER to create another partition.

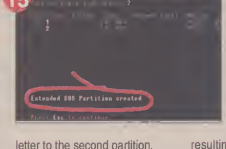
**13.** FDISK will verify drive integrity.

**14.** Next, you'll be asked to enter the size of the partition. To create another partition that is 50% of the drive, type **50%** and press ENTER.

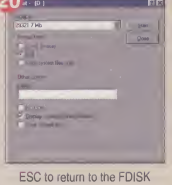



**15.** The resulting screen will verify that the partition has been created. Press ESC to continue.

**16.** Now you need to create a logical drive, which essentially means that you assign a drive letter to the second partition. Following FDISK's verification of drive integrity, the utility will present the size of the logical drive partition. Press ENTER.




**17.** A verification screen will indicate the size of the logical drive and its drive letter. Press ESC to return to the FDISK Options screen.




**18.** Repeat steps 11 through 17 to create additional partitions. Note that the percentages must add up to 100, no more and no less.

**19.** Press ESC to exit FDISK. Type **exit** at the resulting prompt to return to Windows. In order for the changes to take effect, reboot your PC.

**20.** Finally, you must format each partition. Open My Computer and right-click the icon representing each partition. Choose the Format command from the resulting pop-up menu. Select Full as the Format Type and click Start. Follow the on-screen instructions to format the drive. □

the computer on, the antivirus utility installed on the diskette will search the BIOS, boot record, and file system, eradicating any viruses it finds and repairing any damage that occurred. After you remove the diskette and reboot your computer, you should be able to access the hard drive as if nothing happened.

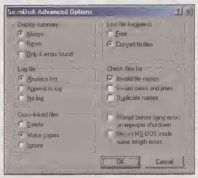
Finally, to ensure the problem doesn't happen again, purchase some antivirus software and use it. Antivirus software installs itself in your computer's STARTUP folder so that it always runs whenever you have the computer turned on. When the software identifies a virus, it attempts to destroy the virus and restore the affected data files to their previous condition.

The most popular antivirus applications on the market are Norton AntiVirus ($39.95; http://www.symantec.com) and McAfee.com VirusScan ($29.95; http://store.mcafee.com). Trend Micro's PC-cillin 2000 ($29.95; http://www.antivirus.com/pc-cillin/products) and Command Antivirus ($24.95; http://www.commandcom.com) are two other antivirus applications currently available. Whichever one you choose, make sure you take advantage of the product updates, which keep your system protected against the latest legion of viruses.

**Mechanical failure.** Drive failure is actually quite rare, but it can happen. If your drive inexplicably stops working after years (or even hours) of use and you rule out a viral infection, you must consider the possibility of mechanical failure as the reason. Before you return the drive to the manufacturer, though, you should visit the drive manufacturer's Web site and download the diagnostic test you find there, says Billy Rudock, senior engineer of technical support at Seagate Technology.

"For whatever reason," Rudock says, "a great percentage of drives that are thought to be bad are not. A regrettable situation is when a person has a good drive, returns the drive, and consequently loses their data. The common reason for a good drive to look like it's gone bad is file system corruption, a device driver that isn't working, a boot record that was clobbered by a virus, or new hardware conflicts."

Rudock says that running the diagnostic test, which can be downloaded to and run off a 3.5-inch diskette, can ascertain whether mechanical failure is indeed the problem. If not, the test will help you rectify the real problem and prevent you from needlessly sending your drive back to the manufacturer.




**Windows' ScanDisk utility helps the operating system manage the hard drive more efficiently. Use the Advanced ScanDisk Options dialog box to specify how you want ScanDisk to handle cross-linked files, file fragments, and other drive errors.**

**Situation:** My hard drive isn't saving as much data as it should.

**Resolution:** As time passes and technology advances, many users eventually run out of storage space. Don't trade in your old drive just yet, though. It's possible that your drive isn't holding as much data as it should. If you think your drive isn't living up to its advertised drive capacity, you need to investigate four possible sources: inefficient partitioning, file system restrictions, BIOS limitations, and false advertising.

**Partitioning.** A lot could—and has—been written about partitions, those virtual areas on a physical hard drive that are treated as distinct storage units. The point we want to make here, however, is that a partition dictates the size of a drive's clusters. Basically, bigger partitions have bigger clusters. That wouldn't be a problem except that a cluster can hold data from only one file at a time. So if you store a 2KB file in a 32KB cluster, the remaining 30KB cannot be used for any other purpose. When dealing with large clusters, you run the risk of ending

## Hard Drive Maintenance Utilities

An interesting characteristic of discriminating PC users is that they often prefer to bring in their own drive maintenance utilities to replace the default selections. These third-party programs are often more powerful with more features than anything Windows offers. In the event that you may want to use an alternative drive maintenance utility, we've highlighted a few of the best currently on the market.

**Ashampoo UnInstaller 2000**
**$19.95**
An uninstall application helps you remove unwanted programs from your PC. This one stands out because of its monitoring tools, which keep an eye on your hard drive at all times. You can then compare the current drive configuration to previous drive configurations and revert to any of them, if necessary.
**http://www.ashampoo.com/uninstaller2000.htm**

**Diskeeper**
**$44.95**
Executive Software's Diskeeper is a disk defragmenting tool similar to Disk Defragmenter, except that it's faster, has the capability of defragmenting multiple drives simultaneously, supports scheduled defragmenting, and allows defragmenting on full drives.
**http://www.execsoft.com**

**Partition Commander**
**$29.95**
Another high-quality partitioning utility is this one from V Communications. Its unique features include an automated partitioning command, which makes the partitioning process as easy as choosing a reason to do it. It also has an Undo command that automatically reverts the drive to its previous partition configuration.
**http://www.v-com.com**

**PartitionMagic**
**$69.95**
PartitionMagic, a popular partitioning utility from PowerQuest, lets you create, split, resize, and merge partitions without losing any data contained within those partitions. It also helps you run dual operating systems on a single drive, move applications between partitions, and change file systems without losing data.
**http://www.powerquest.com**

up with a lot of wasted space on a hard drive. You can minimize the amount of wasted space by creating small partitions.

To partition your drive, use a proprietary partitioning application or Windows' FDISK utility. See the "Partition It" sidebar for information about using FDISK to create multiple partitions on a drive.

**File system restrictions.** The file system your OS uses to organize data on the hard drive could cause you to lose valuable drive space. The consumer versions of Windows employ three file systems: FAT16 (16-bit file allocation table), FAT32 (32-bit FAT), and NTFS (NT file system). Each file system has its unique characteristics, but the feature we want to focus on is the cluster size supported by each.

Basically, FAT16 is less efficient than FAT32 and NTFS. In a 2GB partition, for instance, FAT16 has clusters as big as 32KB, whereas FAT32 has clusters of 4KB and NTFS has clusters of 2KB. Keep in mind that a cluster can hold data for only one file. A 6KB file would occupy one cluster on a FAT16 drive, leaving 26KB of wasted space. The same file would occupy two clusters on a FAT32 drive, wasting only 2KB of storage space. On an NTFS drive, the file would fit in three 2KB clusters, wasting absolutely no space. It's obvious which file systems are the most efficient.

If your drive is stuck in FAT16 mode, you should consider upgrading to a better file system. To see which file system your drive uses, open My Computer, right-click the icon representing the hard drive or partition in question, and select Properties from the pop-up menu. The file system listing will appear in the resulting dialog box, right next to the File System heading. As a rule, users of Win9x and WinMe should use FAT32, while users of WinNT and Win2000 should use NTFS.

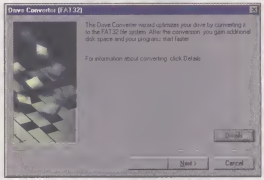
If you're stuck using FAT16 on your Win98-equipped PC (the most likely situation requiring a file system upgrade), then you should upgrade to FAT32. Fortunately, Win98 has a tool that's perfect for the job. Access Drive Converter from System Tools in the Start menu, and then follow its wizard's on-screen instructions. Make sure you back up your drive before running this utility.

**BIOS limitations.** Anyone who has dealt with hard drives in the past knows that drive technology often runs into BIOS limits. The first was at 528MB, then 2.1GB, and 8.4GB. Today, we have the 32GB limit. If you have a drive that exceeds this capacity, you may not be able to access the drive's full storage space. The best solution is to run the installation software provided by the drive manufacturer. In most cases, this software not only contains the necessary BIOS upgrades, but it also provides proprietary partitioning software that can work around FDISK's 68GB limit.

**Truth in advertising.** By most reckonings, 1MB is equal to 1,048,576 bytes. The only exception occurs when hard drive manufacturers calculate the capacity of their products. Drive manufacturers figure 1MB as exactly 1 million bytes. This leads to a disparity between advertised and real drive capacities. For example, a 60GB (measured in million-bytes) drive actually has a capacity of approximately 56GB (measured in megabytes). The difference in measurements accounts for the loss of 4GB in this case. So don't be surprised if Windows reports that your drive has a smaller capacity than the one listed on the side of the box. Your drive isn't malfunctioning. It's just a victim of crafty advertising.

**Situation:** I smell smoke, and I think it's coming from my hard drive.

**One of the best ways to prevent drive-related problems is to use an antivirus utility, such as Norton AntiVirus 2001.**


Drive Converter (FAT32)
The Drive Converter wizard optimizes your drive by converting it to the FAT32 file system. After the conversion, you gain additional disk space and your programs start faster.
For information about converting, click Details.
Details
Next >
Cancel

**You can get better storage efficiency if you convert that FAT16 drive to FAT32. Windows 98's Drive Converter Wizard makes the conversion process easy for you.**

**Resolution:** Turn off your PC immediately. This problem, which is quite rare, occurs when the power cables have been wired incorrectly. Contact the computer manufacturer about getting a new power supply for your PC.

**Situation:** I hear a loud scraping noise coming from inside my machine.

**Resolution:** What you hear is the sound of a **head** (the mechanism inside a drive that reads data from and writes data to the storage media) hitting a **disk** (a platter on which data is stored; the disk is the actual storage media inside a hard drive). This is called a head crash, and the effect it has on your drive is something akin to scratching a fork across the surface of a compact disc.

When you first hear this scraping noise, shut down your PC immediately and don't turn it on again. Next, contact the drive manufacturer and then a data recovery service, such as DriveSavers (800/440-1904, 415/382-2000, http://www.drivesavers.com) and Ontrack Data International (800/872-2599, 952/937-5161, http://www.ontrack.com). The data recovery service may be able to help you retrieve at least some of your valuable data from the destroyed drive. For more information, see "Data Recovery Rescues" in this issue.

**Situation:** My PC is running fine, but I just got a message stating that I should immediately back up my data and replace the hard drive because "A failure may be imminent."

**Resolution:** You've been hit with a SMART alert. That's not some type of strange virus, but rather a monitoring technology incorporated within most hard drives. SMART stands for Self-Monitoring Analysis and Reporting Technology, and it continuously measures various aspects of drive performance, such as **head height** (the distance between the disk and the head), **retries** (repeated attempts to read data from or write data to a disk), and **spin-up time** (the time it takes the drive platters to reach optimum spin speed from a full stop). When it discovers a downward trend in any of these areas, it triggers a SMART alert. Such a message lets you know that the drive is exhibiting behavior that hints of a potential failure.

Your best course of action when you see a SMART alert is to back up your data and contact the hard drive manufacturer to find out how to proceed. LS

*by Jeff Dodd*

# Optical Drives

## Get Back In The Spin Of Things

Not long ago, having the latest in technology meant you had a CD-ROM drive in your computer. You justified it to yourself because some software came on CDs, but you probably just used it to play your audio CDs. Since then, optical technology has made further advances, and you are now regularly bombarded with a range of acronyms such as CD, CD-R, CD-RW, and DVD. With these advancements in technology, new technical problems arise. You now may have problems with discs that won't work in one type of drive or another, and some might even work on one side of the world but not the other.

■ **Optical Mediums.** Before you can troubleshoot your optical drives, you need to know what type of optical media you are using. You probably have a CD-ROM, CD-R (CD-recordable), CD-RW (CD-rewriteable), or DVD (digital versatile disc) drive.

**CD-ROM.** The original PC CD technology is CD-ROM. You can put one of these CDs in your personal computer's CD-ROM drive and read data off it, but you can't write data to the disc. CD-ROMs are suited to the storage of information that requires large amounts of storage space such as sound, color graphics, and video. Games and multimedia software often come on CD-ROMS, too.

Because of the advancements in optical technologies, your CD-ROM drive may not be able to read all media formats. However, if you have a multiread CD-ROM drive, it should be able to read most CD formats but not DVD formats (you will need a DVD drive for that).

**CD-R.** Another common type of optical drive is the CD-R drive. CD-R media lets you write once to any particular place on the disc but only once. Even though you don't have to write to the entire disc in one session, if you do add extra information to the disc, it has to be written to a previously unused location. This means deleting files from CD-R media offers no space-saving benefits. Because CD-R media is compatible with standard CD-ROM drives, you can exchange data written on these discs with users who have only a read-only CD drive. Of course, the person you're sharing the disc with can only read the data you have written to the disc. The user can write data to the disc only if he has a CD-R drive (or CD-RW drive, see below) and the disc has an empty portion that has never been written to.

CD-Rs are a popular format for creating discs containing archives of data. This format is also used for making music CDs. In essence, producing a music CD-R is just like creating one of the CDs that are pressed commercially (the ones you buy in stores) in that most CD drives (in stereos and computers) can read these discs. The technology used to create the disc is different, though.

**CD-RW.** The CD-RW media is a little different from CD-R media. CD-RW media lets you write to the disc many times and to overwrite the data on the disc. Although there is a limit of how many times (around 1,000 times), essentially you can write to the disc, delete files from the disc, and write to the disc over and over again.

A standard CD-ROM drive can't read CD-RW media; rather, you need to use a multiread CD-ROM drive. Because of this, the CD-RW media is not generally used to distribute data among other computer users. However, if you are creating either data or audio discs for yourself, and you only intend to use them on your personal computer (or another multiread CD-ROM drive) then it is a good media to use.

**DVD.** DVD is the newest of the optical technologies. These CD-ROM-like discs can store massive amounts of data in digital form. They are presently used to store video, audio, and even computer programs and data.

A DVD drive should be able to read most CD formats including CD-ROM, audio CD, CD-R, CD-RW, Photo CD, and DVD-ROM and DVD video formats. In addition, these discs eventually may replace regular CD-ROMs, as well as VHS videotape and laser discs.

■ **Problem Solving.** Here are some typical issues that you may encounter using CD-ROMs, CD-Rs, CD-RWs, or DVDs in your appropriate drive. Some of the problems you can resolve with our handy tips, but some will require professional intervention.

**Reusing AOL CDs.** If you've ever tried to write data to some of your old AOL CDs using your CD-R or CD-RW drive, it probably didn't work. CDs, such as those AOL sends you, can't be written to because they are not specially designed for this purpose. Commercial CDs and those you write to yourself are created differently and can't be interchanged. To write data to a CD, you must buy special CD-Rs or CD-RWs.

**DVD regions.** If you are having trouble playing a DVD movie on your PC, there is a chance the regional code for the DVD doesn't match the DVD player. There are six regions throughout the world, and DVDs are coded according to the region in which they are sold. This must match the region of your DVD player. For example, if you live in North America, your player should be set to region 1. Some DVD players let you change the region a few times before they set themselves to a single region; others can only play discs from one region. If you are playing imported DVDs, or you're playing on a DVD drive that you purchased overseas, this may be the cause of your problems and the only solution is to buy a new player or buy discs that are suited to the player you have.

**Drive won't read disc.** When you put a CD or a DVD in your optical drive and the drive can't read it, begin by eliminating obvious problems such as the disc being inserted upside down. This is easy to do if you're using unlabeled CD-Rs or CD-RWs. Open the drive and reinsert the disc the correct way.

If this isn't the problem, restart your computer by shutting it down completely and starting it up again. Sometimes a simple reboot will eliminate the problem. In addition, check to ensure the CD or DVD isn't scratched or dirty. If it is dirty or damaged, follow the instructions in the "Dirt-Free Discs" sidebar to clean it.

If none of these solutions work, make sure the drive's connectors and power supply plugs are plugged in tightly. If all else fails, reinstall your drive. If you reinstall your drive or want to check the drive's connectors on the inside of the PC, make sure to unplug the computer before you open up your case and to use an antistatic device to prevent damaging the internal components of your personal computer.

If you need to reinstall your drive, first remove the drive from Windows. Click the Start button, Settings, and then Control Panel. Double-click System and select the Device Manager tab. Select the drive and remove it. Next, remove the drive's physical connections to the personal computer and reboot your PC. Shut down your PC again, reconnect the drive, and reboot the computer. Now install the drive using the manufacturer's driver, which should have been supplied with the drive.

**DVD players.** A certain combination of DVD player and DVD may result in a player not being able to play a disc. However, that same disc may play perfectly in another player. Once you've eliminated the possibility of a dirty disc and tried it successfully in a different player, then the problem is likely with the player itself. If this is the case, contact the player's manufacturer and see if it is a known problem with the player. If it is, see if the manufacturer has a workaround solution or if an upgrade for the player is available.

**Audio CDs won't play.** If you make audio CDs on your PC and they play fine on your computer but not in your regular audio CD player, then you probably are trying to play a CD-RW.

Chances are you wrote your audio using a CD-RW, and your audio CD player is having difficulty reading it. In most cases, CD-RWs won't play on standard CD players. If you want to create an audio CD you can play in a variety of players, use a CD-R instead of a CD-RW.

If you are using CD-Rs already, then you may be experiencing incompatibility between the media you are using and your player or recorder. Not all CD-Rs will work in all players, and they won't work properly with all recorders either. So try buying another brand of CD-R media and see if that makes a difference either in the recording or playing process.

Another reason for a CD-R to not work in an audio CD player is you omitted to close the disc when you finished writing to it. An audio CD that you haven't closed won't play on a standard CD player even though it may playback just fine on the drive on which you recorded it. To check the status of the disc in Easy CD Creator, for example, select the Disc menu and then Disc Information to see if the Close Session button is enabled. If it isn't, click it to close the session so you can play audio tracks from the first session in standard CD players.

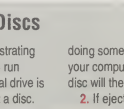
You should also ensure that you write all your audio data to the first session of a multisession CD. Standard CD players expect to find audio data in the first session and, if it isn't there, they don't know how to look for it anywhere else so they simply won't play anything. Remember, too, that you must write to audio discs in the CDDA (CD Digital Audio) format, which is the standard used to record music CDs and what a standard CD player expects to find audio data recorded in. Even though simply copying a series of .WAV files from your hard drive to a CD may work in your computer CD player, it

## Delinquent Discs

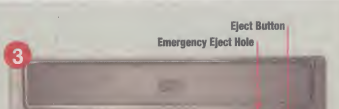
One of the most frustrating problems you can run across with your optical drive is not being able to eject a disc. Before you wreck your optical drive (and maybe your entire computer) by trying to pry open the drive, follow these simple steps.

**1.** Before calling a technical support phone number or doing something drastic, reboot your computer and see if the disc will then eject.

**2.** If ejecting the disc the regular way doesn't work, open Windows Explorer by right-clicking the Start button and selecting Explore. Then, locate the drive on the left side of the screen. Right-click the problem drive and select Eject from the pop-up menu.




**3.** If this fails, press the Eject button on the front of the CD drive. If the drive door still will not open, turn off the computer and insert a large open paperclip (or a thin rod) into the Emergency Eject Hole in the front of the drive to manually open the tray. □



## Dirt-Free Discs

A dirty or scratched CD or DVD (digital versatile disc) can cause replay errors, from minor skipping problems to a disc's total failure to play. To maintain your CDs and DVDs, follow these simple instructions for cleaning, storing, and handling your discs.

### Handling & Storage

Handle the disc at its hub or the outside edge and avoid touching the disc surface itself.

Store in its protective case when it's not in use and take care not to bend or scratch the disc when removing it from or inserting it into its case or the player's tray. Ensure you have it correctly seated in the player's tray before you insert the tray into the drive. When you store your discs, keep them away from direct sunlight, heaters, and other hot surfaces such as the car dashboard.

### Disc Cleaning

To clean a CD, use a soft, dry, and lint-free cloth or a special CD cleaner to remove dust and fingerprints. Wipe the disc radially, moving from the inside or hub of the disc to the outside edge. In addition, avoid using organic solvents, abrasives, antistatic solutions, or record-cleaning fluids on CDs and DVDs; these can damage the disc surface.

If you need to clean your drive, you probably should take it to the repair shop. However, you can help keep it clean by keeping the CDs and DVDs you use in it clean. You also should keep your PC and the drive itself as clean as possible. Do this by keeping your work area clean and dust-free. In addition, avoid having open windows near your PC and keep pets away from your computer. Plus, never leave the player tray open for an extended period of time. □

**Make sure you always handle optical discs by their outside edges so you don't damage them.**

isn't a format that a standard CD player understands, so always choose the CDDA for creating audio CDs.

**Computer to computer mishaps.** You've made some CDs and you can't read them on another computer. If you are using CD-RWs, and then trying to read them on an older CD-ROM drive, it won't be able to read the discs. Old CD-ROM drives aren't multiread compliant so if you're creating discs and want them to be easily read in nearly all situations, use the CD-R format instead.

Even if you're using CD-Rs, you may find that some older CD-ROM drives use lasers that aren't calibrated to read recordable CDs, although they can read factory pressed ones. If this is the case, contact the CD-ROM drive manufacturer to see if that is a known problem and, if so, if there is an upgrade available for your drive.

In addition, like playing audio CDs in a standard CD player, you may simply have come up against media incompatibility issues. This means the combination of the disc, recorder drive, and player drive (CD-ROM) types you are using just do not work together. In this case, it may pay to change media brands and see if that resolves your problem.

**Writing failures.** When you write to a CD, and it fails at some point during the write process, your data source may be unable to keep up with the pace of your CD drive. The computer is trying to assemble the files to send to the CD but can't keep up. Excessive fragmentation of files on your drive can cause this problem. Try defragmenting the drive and see if that solves the problem. To do this, click the Start button. Then, click Programs, Accessories, System Tools, and then Disk Defragmenter.

Another common problem is the computer itself may be kicking into a lower power mode when there is no keyboard activity for some time. If your computer has power-management functions or a screen saver that shuts down the PC when it is idle for a certain amount of time, disable it while you are creating the CD.

If the problem remains, slow down the writing process at the CD end by reducing the speed the computer writes data to it. To do this, set your writer's speed to 1x. This slower writing speed may give the computer the extra time it needs to gather up the data before writing it to the disc.

**Creating CD-RWs.** If you try to write to a CD-RW using a CD-R drive, you won't have much luck. The problem is you can't write to CD-RWs using a standard CD-R drive, but you can create a CD-R using a CD-RW drive. If you want to write to CD-RWs, you'll need a CD-RW drive.

**Keeping busy.** When the Busy indicator light on your CD drive comes on and stays on, this is an indication of a problem with the drive itself. A disc not correctly seated in the tray could cause this. Eject the disc by pressing the Eject button on your drive and then ensure the disc is correctly seated in the tray before pushing the button again.

If the problem persists, reboot the computer. If the light remains on, it's probably time to call technical support.

**Quiet time.** Sometimes, it is the simplest thing that can cause the biggest problem. If you've recently installed a new CD-ROM or DVD-ROM drive and can't seem to get the audio to work, take heart. You may have forgotten to connect your new drive to your sound card. This is a simple problem to fix if you follow the directions in your new drive's manual. Most new drives ship with a cable that connects internally to the sound card. However, sometimes even that cable won't work because of sound card incompatibility. If you've correctly connected the cable and you still don't get any sound, you may want to call the manufacturer of your sound card.

■ **More Help.** If none of these suggestions solve your problem, contact the manufacturer of your optical drive or see if it has any solutions on its Web site. You may even be able to download an updated driver to correct the problem. LS

*by Helen Bradley*

# Diskette Drives

## Minimize Downtime & Prevent Data Loss

Most computer users take their system's diskette drive for granted. There's no glamour in a no-frills electromechanical device that reads from and writes to 3.5-inch removable diskettes. Yet diskettes, which are also known as floppies because of the diskette's flexible film, are the medium to which most computer users entrust their data. Like the ingredients you purchase for a gourmet meal or the sneakers you put on your feet when practicing for your marathon runs, you want the very best.

Diskette drives, sometimes referred to as FDDs (floppy disk drives), store data on magnetically-coated Mylar film. Compared to hard drives, diskette drives are slow and cumbersome, with a limited 1.44MB storage capacity. Yet they're useful for transferring small files from one computer to another and for making backups of selected data. They also serve as the PC's secondary boot device, should the computer hard drive malfunction. Over time, however, a diskette drive can wear out, and the magnetic media used to store the data could become corrupt. In addition, diskettes and drives often experience other problems with continued use. Here we discuss common drive and diskette problems and their solutions to minimize downtime and prevent loss of valuable data.

■ **Can't Transfer Information.** Make sure the diskette is properly formatted. To do this, insert a diskette in the drive, double-click My Computer, and right-click the icon for the diskette drive; typically, it's called 3 1/2 Floppy (A:). Select Format from the pop-up menu and follow the on-screen instructions. You might receive the error message "Track 0 Bad" or "Diskette Unusable" if you try to format a 720KB diskette in a 1.44MB drive as a 1.44MB diskette. Formatting a diskette will delete anything on it.

■ **Check Diskette For Errors.** Most computer users think of Windows' ScanDisk as a hard drive utility, but you can also use this applet to locate and correct diskette problems. If a diskette won't let you save to or retrieve files already saved to it, verify the integrity of disk sectors (data areas) by double-clicking My Computer, right-clicking the diskette drive's icon, then clicking Properties. Select the Tools tab and click Check Now. Select the diskette drive, and then click Thorough to have ScanDisk check for surface errors, in addition to looking for file and folder errors. Click the Options tab to customize ScanDisk operations even further. Default selections direct ScanDisk to verify system and data areas on the diskette, read the contents of each disk sector, and write the contents back to each sector to verify diskette reads and writes. ScanDisk also automatically repairs bad sectors by moving data to an error-free location. To have ScanDisk repair all found errors, place a check mark in the Automatically Fix Errors box. Click Start. When the process completes, ScanDisk will provide a Summary of its work. By default, it converts lost file clusters into files named File0000.chk, File0001.chk, etc., which it stores on your hard drive in the root directory.

■ **Can't Read From/Write To Diskettes.** Diskette drives function much like hard drives. Read/write heads position above a spinning medium, which in turn is coated with magnetic material. If the drive is writing data to diskette, the write head magnetizes the particles embedded on the diskette as the medium spins and stores the data in binary format (0s and 1s). The data location is written to a special area on the diskette called the FAT (file allocation table). When the drive reads diskette data, it looks up the data location in the FAT, and then it moves the read/write heads to the first data sector to grab the data and send it to the computer.

Read/write heads in a diskette drive are spring-loaded. They are designed to grip the medium's surface from top and bottom. This constant grabbing, combined with prolonged exposure to dirt particles, grit, and grime, makes diskette media unreliable. Spraying compressed air inside a diskette drive to remove dust, dirt, and other contaminant buildup may actually exacerbate a diskette drive problem because it will lodge dirt in hard to reach places. Similarly, inserting a cotton swab into the drive slot may misalign the read/write heads. Instead, use a commercially available cleaning kit containing a special pretreated cleaning diskette. Insert this diskette in your system when the power is off, then power on the computer. Remove the diskette after 20 to 30 seconds.

If you experience errors when reading or writing to a diskette and you've ruled out problems with the diskette itself, check the settings in your computer's System Setup program. At

startup, press the key that will enable you to enter System Setup. Depending on your computer, it may be the DELETE key, the F1 or F2 key, or the ESC key. Navigate to the Diskette Options Section of the System Setup program. (On Dell Dimension computers, diskette drive options are typically accessible from the Advanced menu.) Verify that the diskette controller is enabled. The controller is a special kind of chip with circuitry to control reading from and writing to a diskette. It is also responsible for the transfer of information to and from system memory (RAM). Other settings in System Setup ensure the correct diskette type is selected and the Diskette Write Protect option is Disabled. If Diskette Write Protect is Enabled, you won't be able to write to a diskette. If the option is set to Disabled, the computer can write to a diskette as long as the diskette's write-protect tab is not in place. Save your changes, then exit.

■ **General Troubleshooting.** During a typical system startup, the indicator light on a computer diskette drive should light up as data transfers to and from the drive. If this indicator fails to go on, watch your computer monitor screen for system error messages. An alert may identify a particular problem that exists or provide status information.

For example, during the boot process, if a message pops up stating "Diskette Drive A Error," this tells you that Drive A: is present, but it failed the BIOS (Basic Input/Output System) POST (power on self test). Alternatively, the error message may read "Incorrect Drive x type." To troubleshoot these messages, ensure that the drive is defined correctly in the System Setup program (see the "Can't Read From/Write To Diskettes" section in this article). On some computers, the boot sequence will not continue when the diskette drive malfunctions.

## Replace Your Diskette Drive

Here is a general outline of how to replace a faulty diskette drive. These instructions were used to replace a defective Dell Dimension XPS R450 diskette drive, so the procedure may differ slightly for your computer.

**1.** Secure a replacement drive for your computer.

**2.** Make sure you have #1 and #2 Phillips screwdrivers on hand before you start.

**3.** Power off the computer and any attached peripherals, then disconnect all the power cords.

**4.** Remove the computer cover, turning the computer on its side if necessary.

**5.** Wear a wrist-grounding strap clipped to an unpainted metal surface to discharge any static electricity from your body. If a wrist strap is unavailable, touch an unpainted metal surface at the back of the computer.

**6.** Some computer cases have a front bezel that must be removed before you can replace a defective drive. To remove this bezel, remove the computer cover and press in the tabs along the top and side of the bezel. With tabs pressed in, gently swing the bezel away from the chassis, carefully disengaging the hooks as you pull.

**7.** Before removing the drive, note the location and orientation of all cables and power connectors attached to it. If there is a colored stripe on the drive's flat ribbon cable, make a note of where that stripe is located when the cable is attached. Use a felt tip marker to mark the cable's connection orientation.

**8.** The diskette drive sits in a drive cage. Remove the drive-bracket mounting screws fastening the drive cage to the chassis. There should be at least two screws, one on either side of the drive cage. Place these screws in a cup for safe keeping.

**9.** Slide the drive cage/drive assembly forward, about one-half inch. Then lift it up and away from the chassis.

**10.** Slots on the side of the computer chassis secure the drive cage/drive assembly. You must detach the drive cage from these slots in order to slide it forward.

**11.** Mark the failed drive with a felt tip marker to prevent you from reinstalling the bad drive.

**12.** Remove the drive cage bracket from the defective 3.5-inch diskette drive. The bracket may be fastened to the drive with screws (one on either side of the drive and one on the bottom). Remove these screws.

**13.** Disengage the broken drive from the drive cage bracket. Use the drive cage screws to fasten the new drive to the drive cage bracket. If there are any jumpers at the back of this replacement drive, set them the same way as the jumpers on the defective drive.

**14.** Slide the drive cage/drive assembly back into the bay. Make sure the three dents on the side of the computer chassis secure the drive cage/drive assembly to the computer. Screw the drive case to the chassis. Reconnect the flat ribbon cable, making sure the red stripe is oriented correctly and securely, and that no pins on the connector are visible. Reconnect the DC power connector. If the connectors do not appear to fit, don't force a connection.

**15.** Verify that all other cable connections inside the chassis are securely fastened and reattach all covers, cables, and power cords.

**16.** Power on the computer and watch the screen for error messages. If any appear, power off the computer, then disconnect all power cords. Verify that cables and connectors are correctly installed. If no error messages display at startup, insert a blank diskette into the diskette drive. Format the diskette. If formatting completes successfully, your new drive has been installed correctly. □

■ **Can't Eject Or Insert A Diskette.** Only one diskette can occupy a drive at a time. Diskette drives feature a manual eject button, so make sure to eject the first diskette before inserting a second one. If the button has broken, it's probably less expensive to replace the drive than to repair it.

When inserting a diskette, make sure the metal disk on its underside faces the eject button. Otherwise, the diskette will not slide into the drive slot. To avoid damaging a drive's delicate mechanical parts, never force a diskette into a drive.

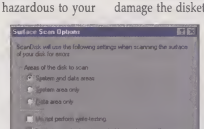
■ **Prevent Writing To A Write-Protected Diskette.** On the backside of a 3.5-inch diskette is a write-protect tab, which can turn it into read-only medium. When the slider in the tab blocks the hole, you can read from, write to, or format the diskette. Slide the tab to reveal the hole and the computer can read from but not write to or format the diskette. To ensure the diskette is unwriteable, you may want to enable Diskette Write Protect in the System Setup program. Once enabled, you cannot write to a diskette.

■ **Drive Can Only Recognize High Or Double-Density Diskettes.** The amount of data a diskette can hold depends on its storage capacity and density. High-density 1.44MB diskettes can hold more data than double-density 720KB diskettes because they can embed smaller magnetic particles on their magnetically-coated film. The smaller the particles, the more data the medium can store. A high-density diskette drive typically has the circuitry enabling it to read data stored on a 720KB double-density diskette. It may not have the circuitry to read 2.88MB diskettes. To verify whether your system's BIOS offers support for 2.88MB diskettes or drives, enter your System Setup program at startup, then examine the options available for Diskette A:. If your drive writes to double-density diskettes (such as 720KB diskettes) but not 1.44MB diskettes, change the diskette type to 1.44MB in your computer's System Setup program.

**If you can't transfer data to a diskette, make sure it is properly formatted.**

■ **Magnetic Field Problems.** Electrical signals inside a monitor send out electron beams, creating tiny dots of light on the screen's phosphorous coating. Magnetic fields move these beams around. The presence of focused electron beams and magnetic fields inside the monitor and the EMF (electromagnetic frequency) that monitors emit can prove hazardous to your diskettes. Stray magnetic charges can weaken the magnetic properties of a diskette area, causing data loss. Alternatively, they can scramble the binary data stored on your diskette, rendering it unreadable. Do not place a diskette on or near a monitor chassis.

Similarly, avoid magnetic field sources found around the motors in heaters, air conditioners, fans, telephone handsets, and electric pencil sharpeners. While a computer's audio speakers also contain magnets, typically, the speakers are shielded to prevent data corruption.


Surface Scan Options
ScanDisk will use the following settings when scanning the surface of your disk for errors:
Areas of the disk to scan:
System and data areas
System area only
Data area only
Do not perform write-testing
Do not repair bad sectors in hidden and system files
OK
Cancel

**The Windows ScanDisk utility will verify system and data areas on a diskette, reading the contents of each sector and writing the contents back to each sector.**

■ **Physical Damage.** Diskette drives wear out. Heads can become misaligned over time. Motor speed accuracy can drift due to normal wear and tear. Misaligned diskette drives may not be able to read from or write to diskettes created in other systems. In addition, other drives may not be able to read from or write to diskettes your system has formatted. If you experience increasing incidents of read/write errors, it's time to replace your diskette drive. (See the "Replacing A Diskette Drive" sidebar).

A diskette will "crash" (become inoperable) if its read/write magnetic heads hit the recording surface. When this happens, the read/write head assembly or the diskette itself may become totally useless. Crashes sometimes result from mechanical shock, uncontrolled vibration, or mishandling the drive when its indicator light is on. Avoid data loss by backing up important files.

To minimize diskette damage, never jar the diskette drive. Avoid touching a diskette's Mylar film recording surface. Touching the surface might damage your drive's read/write heads by depositing oil and grime on the delicate mechanism. Avoid spilling any liquid on the diskette medium. Do not overheat the diskette by leaving it in the hot sun or placing it close to a radiator or other heat source. If you damage the diskette, you'll probably have to replace it. Before tossing a diskette into the trash, however, insert it into the diskette drive one last time and double-click its icon in My Computer. If you can open any files, save them to your hard drive temporarily, then move them to another diskette. If you need to replace your drive, be sure to purchase one that matches the specs on your existing diskette drive.

■ **Diskette Boot Failure.** If you're trying to boot a computer from a diskette inserted in the diskette drive and you receive a BIOS error message at startup stating "Diskette Boot Failure," the diskette in drive A: may be corrupt or it may have a virus. If neither is the case, verify that the diskette is formatted, otherwise you won't be able to use the diskette.

You can check for viruses by using an antivirus application such as McAfee.com VirusScan (a full-working evaluation copy is available for downloading free of charge from the McAfee.com Web site [http://download.mcafee.com/eval/evaluate2.asp]). You can verify whether a diskette is corrupt by testing it with ScanDisk (see above) or Symantec's Norton Disk Doctor (http://www.symantec.com/nu/nu_9x).

■ **Drive Not Accessible.** If you insert a "healthy" formatted diskette in drive A: and try to access files on diskette, but a message pops up telling you the diskette is not formatted, do not format the diskette. Try running ScanDisk. If ScanDisk reports that there is no diskette in drive A: or that the diskette in drive A: is not formatted, your drive needs to be replaced. (See the "Replacing A Diskette Drive" sidebar.) Before replacing the drive, however, verify the drive's settings in your System Setup application. LS

*by Carol S. Holzberg, Ph.D.*

# Cartridge Drives

## Tricks & Maneuvers For These Data Storage Components

Although cartridge drives seem simple enough—you plug a cartridge (some are called disks) in, save your data, and eject the cartridge—they have a few catches that can bring your alternative storage drive to a grinding halt. Flashing red lights, unusual clicking sounds, stuck cartridges, and system freezes can plague these drives if they are misused or installed incorrectly.

If your Zip, Jaz, or ORB drive is creating trouble for you, consult our generic troubleshooting tips below. If you are still having problems, check the tips we've listed for each individual drive. Then, if your drive still has you stuck, we recommend that you consult your drive manufacturer's technical support department.

■ **Follow The Light.** The first thing to check is whether the activity light on the front of your Zip, Jaz, or ORB drive is on. If it does not illuminate, the drive is probably not receiving any power. Check to see whether the drive is plugged in. For example, if it is a USB drive, it will probably have a power cord that should be attached to both the drive and an electrical outlet. In addition, check the electrical outlet by plugging in another device.

If the drive is an internal unit, you'll need to open your computer case. First, ground yourself by touching something metal to discharge any static electricity, then open your case, and check whether the power connection is firmly in place. The internal power connector generally has a white end with red, yellow, and black wiring.

After closing the PC case, check to see if the drive has simply powered itself down. Many cartridge drives have sleep modes and power themselves off when not in use for a set amount of time. When you access the drive through your computer, the drive should power back on. Next, make sure you've installed the driver that came with the drive. If this driver is not installed properly, the PC won't recognize your drive.

If a light is flashing, such as the amber light on the external 2GB Jaz or 100MB Zip drive, or the single light on all other Jaz and Zip models, the drive has power. It is normal for this "Busy" light to flash quickly when it is spinning the disks to access or write data. It also might spin sporadically when the drive is in use. However, you should contact Iomega if the drive blinks slowly for a long time when you attempt to access several cartridges, or if the light stays on continually. Iomega also asks that you contact its representatives if the drive is not "spinning" cartridges properly.

The lights on the front of the ORB drive also identify how it is operating. The steady green light means it has passed its power-up test and is ready for use. The flashing amber light means it is accessing or loading a disk. The red light is bad news. It means there was an error while the drive was accessing a cartridge. Count how many flashes you see and contact Castlewood System's technical support. One red flash means a failure in ROM, two flashes is a RAM failure, three is a DRAM failure, four is a problem with the internal bus, and five is an interface problem. If the red light stays on, the drive might be defective and you should contact Castlewood about returning it.

■ **Corrupt Cartridges.** If your cartridge ejects as soon as you plug it into the drive, and you are inserting it properly, try another cartridge. If it works, then you know your drive is still operational and the problem is with the cartridge. The cartridge may have become corrupt or accidentally demagnetized and will not work. If the cartridge causing you problems is new, return it to the store for a replacement.

On the other hand, if the drive also ejects the second cartridge you insert, then your problem is with the drive and you may need to contact its manufacturer for technical support.

■ **System Freezes.** If the drive is causing your system to freeze, there might be a drive conflict. First, make sure that all your connections are in place. Next, make sure each end of the drive cable is connected firmly to your drive and your PC before attempting to restart your PC.

**Parallel port.** If the drive is connected via a parallel port, try to disable the Status Monitor for your printer. Iomega says that this program checks the status of your printer and can interfere with the use of some parallel port drives.

Also, make sure that another device is not using the **IRQ (interrupt request lines)** 07 setting. (IRQs are routes that transport communications signals to the processor.) Open the Device Manager by clicking Start, Settings, Control Panel, and double-clicking System. Then select the Device Manager tab, double-click the Computer listing, click the IRQ option, and make sure that the IRQ 07 listing is set to LPT 1. Also, check to make sure that it is the only device using the IRQ 07 setting.

You may want to try to change your parallel port mode. First, you must access your computer's BIOS (Basic Input/Output System). Check your computer's documentation to find out how to access the BIOS. Locate the entry for the Parallel Port mode and change it to another common mode, such as EPP (enhanced parallel port), bi-directional, or compatible/standard.

**USB.** Before you install a USB (Universal Serial Bus) drive, you should make sure that the port is working. You'll need to access your PC's BIOS and look at your **CMOS (complementary metal-oxide semiconductor,** a chip that contains basic data about components such as your drives) options. There should be a listing for a USB controller. If there is an option to enable or disable the USB port, enable the port.

If the problem appears to be that a driver was never installed, go to the Control Panel and double-click Add/Remove Programs. Here, you should be able to install a USB driver. You might need to insert your Windows installation CD-ROM when prompted. Or, access the computer manufacturer's Web site to see if you are using the most current USB driver available.

Make sure your USB device is not trying to share an IRQ setting with another device. (You may see a yellow exclamation point next to the device listing in the Device Manager.) Iomega says this can prevent the normal operation of some USB drives.

In addition, you can disconnect a USB device while the computer is on, but not while the USB device is accessing data. If you attempt to disconnect a USB drive while its activity light is on, your system will likely freeze.

**SCSI.** Although SCSI (Small Computer System Interface) drives operate quickly, they can create a number of problems if they are not connected properly. First, make sure the correct and most current driver for your SCSI card was installed.

A SCSI card is capable of chaining together several SCSI devices, all of which have access to the computer. Each SCSI device should have a unique device identification number. The IDs range from 0 to 7. To check the settings, click Start, Settings, and open the Control Panel. Double-click System and choose the Device Manager. Locate the Disk Drives option and click the plus sign (+) next to it. Select the Jaz drive option (to highlight it) and click the Properties button. In this dialog box, click the Settings tab and check the Target ID (this is the SCSI ID). Then, proceed by checking the other SCSI devices through the Device Manager and make sure none are set the same.

Changing settings differs from drive to drive. Regardless, always make sure the power is turned off whenever you tinker with an SCSI drive. On the ORB drive, the switch to reset the drive ID is at the bottom of the drive, and it can only be set to use 0, 4, 5, or 6. On the Jaz drive, you must change the jumper settings on the bottom of the drive. Check your drive's documentation to find out how you can alter its drive ID.

The end of the SCSI chain must also be properly terminated. The terminator is commonly a short black strip that looks like the plug strip on the end of the SCSI cable that you plugged into your internal drive. It should be connected to the last device in your SCSI chain. If your drive is last in the chain, you may have to set the termination differently, depending on the drive.

For example, with the internal Zip drive, the drive can be set to terminate the chain through jumpers on the back of the drive. Check your drive's documentation to see if you are properly terminating the drive if it is last in the chain. Also, make sure that no devices in the middle of the SCSI chain are terminating the connection in front of your drive.

SCSI devices also limit the length of the cable used to connect them. The maximum length depends on the SCSI card being used and its type. (For instance, an Ultra SCSI card may require a shorter cable.)

As a comparison, consider that the maximum length for a Zip Zoom card is 19.6 feet, while the maximum length for a Jaz Jet PCI (Peripheral Component Interconnect) card is 4.9 feet. Check your SCSI card documentation for the length requirements and then double-check the length of your cabling. Each device on the SCSI chain adds one foot of cabling. To determine the total length, measure all the cables between the devices, add them together, and then add one foot for each device attached to the chain, including the SCSI card itself. If you use too long of a cable, you can lose data or cause data corruption.

■ **Damaged Drives.** Check over the drive to make sure it has not experienced any physical damage. Was it dropped? Did something crush it? Look at the drive to make sure the outside case wasn't damaged, or that the drive door on the front of the drive (where you insert cartridges) wasn't broken.

Also, check the cable connectors to your drive. Are the pins that connect the cabling to

## Questionable SCSI Cable With Internal Jaz Drives

Iomega shipped some of its internal SCSI (Small Computer System Interface) Jaz drives with cables that may have a problem with their termination block. This problem can prevent your computer from booting or cause it to lock up after 15 or 30 minutes of operation.

**1.** To check the cable, first turn off the computer, unplug the power cord, ground yourself by touching something metal to prevent static electricity discharge (which could damage internal computer components), and then open the computer case.

**2.** Locate the Jaz drive and find the gray SCSI cable connected to your SCSI card at the back of the drive. Unhook the cable from your drive and remove the terminator block from the cable (see Iomega's instructions at http://www.iomega.com/support/documents/10577.html).

**3.** Plug the cable back into the drive, close the computer case, and plug in the power cord. Now you can turn on your computer and restart your system to see if the computer properly boots. However, *do not use* your Jaz drive because it doesn't have a terminator block connected to the cable and using it will damage the drive. Only follow our guidelines to restart your computer to see if the problem is a defective cable and terminator. Wait to use your Jaz drive until you receive a replacement SCSI cable and termination block from Iomega and install them. You can visit the Iomega Support Contact Center (http://www.iomega.com/support/nav_contact.html) for information about who to contact about getting your replacement parts. □

## Proper Care & Handling

- As with all computer components, don't get your cartridge drive wet. Keep cartridges away from contaminants (such as dust) or excessive heat.
- Avoid contact with magnetic fields or those around components such as your speakers or monitor.
- Always turn on the computer before you insert a cartridge. If a cartridge is in the drive with the power off, and the power suddenly comes on, this can damage the cartridge.
- Always eject cartridges when you move the drive. And, of course, don't drop the drive.
- If a cartridge is stuck, never force it out of a drive. If necessary, use the manual eject method as described in this article.
- Make sure the drive is not accessing data on the cartridge (watch for the flashing activity light) when you remove a cartridge or turn off the drive.
- Drive manufacturers recommend that you don't leave cartridges halfway in the drives. Instead, they recommend storing cartridges in their protective sleeves.
- Don't stick anything else into your drive other than an appropriate cartridge.

the drive or other components bent or missing? You don't want to operate the drive if it has been damaged. If there is a physical problem, contact the drive manufacturer to see if it can be repaired or if you must purchase a replacement.

■ **Zip Drives.** One of the most popular storage alternatives is Iomega's Zip drive (800/697-8833, 801/332-1000; http://www.iomega.com), which can store 100MB or 250MB per disk, depending on which drive you buy: the 100MB Zip drive or 250MB Zip drive. The 100MB drive can store and read only from Iomega's 100MB Zip disks. The 250MB drive can store and read from Iomega's 100MB and 250MB disks.

But even popularity has its limitations. For one thing, the 100MB and 250MB sizes don't offer much storage space for video files, and they operate too slowly to run these files. The Zip has a data transfer rate of 1.4MBps (megabytes per second) for the 100MB drive and 2.4MBps for the 250MB version. It also has an average seek time of 29ms (milliseconds), which hardly compares to the rates of its competitors.

**Continually clicking.** Zip drives, and some other cartridge drives, make a clicking noise when you first insert a cartridge. However, the clicking noise should not continue for an extended period. Check to see if the cartridges cause the noise. They may have been demagnetized. For example, some stores stick magnetic strips on products that are scanned when you purchase them. Try another cartridge that was not bundled with the one you just tried.

Alternatively, run Zip Diagnostics. Double-click the My Computer icon, right-click the Zip drive icon, and select Properties. Click the Diagnostics tab, and then click Diagnose Now to find out if the problem is with the drive. If your drive fails the test, continually makes the clicking noise, or tells you there is no cartridge in the drive when there is one, contact Iomega.

**100MB and 250MB compatibility.** Before you automatically blame the drive for rejecting a cartridge, check to make sure you are using the correct type of cartridge. Remember that 100MB drives cannot use 250MB cartridges and will automatically eject them.

**The right type of SCSI.** If you've installed your SCSI Zip drive correctly and it still won't work, you may not be using the right SCSI type. Zip drives do not meet SCSI-2 or Ultra SCSI specifications and may not work properly if your computer contains one of these types of SCSI cards (although it may work without a problem, too). Iomega says that Zip SCSI drives are compatible with most SCSI cards that are 100% ASPI (Advanced SCSI Programming Interface)-compatible. To make sure you won't have any compatibility problems, Iomega recommends that you use its own SCSI card (of course), the Zip Zoom SCSI adapter.

**USB conflicts.** In some versions of Windows, such as Windows 95 and NT, you can only have one USB device connected to the computer through the USB port. If you are attempting to connect more than one USB device with these operating systems, the drive will not function properly.

**Caring for 250MB cartridges.** Just as you shouldn't drop or get Zip cartridges wet, also keep the yellow sticker on the back of the 250MB cartridges away from direct sunlight (and don't remove the sticker). If this area is damaged, the cartridge cannot access data.

**Emergency eject.** If your computer and Zip drive are powered off before you can eject a cartridge, or a power failure prevents you from removing a cartridge, you can manually eject it. How you do this depends on the model of the drive and the year it was manufactured. A small hole may appear on the front or rear of the drive. If you can't find the hole on the front of the drive and the Zip drive is an internal unit, you may have to open your computer case (remember to ground yourself to discharge static electricity) and check the back of the drive. Before doing this, make sure the computer and drive are both turned off. To eject the cartridge, take a paperclip and straighten it. Insert the end of the paperclip into the hole and push until the cartridge ejects.

■ **Jaz Drives.** The Zip drive's big brother, the Jaz drive, is another storage option from Iomega (800/697-8833, 801/332-1000; http://www.iomega.com), but this one offers more storage per cartridge and much faster access to the data. Jaz drives can store 1GB or 2GB of data per 1GB or 2GB disk. (A 1GB drive was available, but was discontinued more than a year ago.)

Jaz drives also have more speed, seeking data at 10ms and writing it in 12ms. Its data transfer rate of 8MBps really zips past Zip drives. However, as with any product, it also might cause its users a few problems.

**Write-protection woes.** If your newly purchased Jaz cartridges ask you for a password when you attempt to store information, they may be write-protected. To remove the write-protection so you can record data to the cartridge, insert the cartridge into the drive. Double-click the My Computer icon and right-click the drive-letter icon representing your Jaz drive. Then, click Unprotect. When asked for a password, type **APlaceForYourStuff** in the field.

Next, click the checkbox next to Remove Protection Only Temporary so that the check mark disappears. Click OK, then click OK again, and the write protection should be gone.

If that doesn't work, you may need to "long" format the cartridge. Formatting will erase all the data on it, so you may not want to do this on a used cartridge. Double-click My Computer and right-click the drive letter representing your Jaz drive. Click Format and then select Long Format. This can take 10 to 20 minutes, but you should be able to use the cartridge without worrying about the write-protection status anymore.

**Forgotten passwords.** Unfortunately, if you forget a password for a password-protected cartridge, you can't expect to get the information back. It's lost until you remember your password. However, if you still want to use the cartridge, you will need to reformat it. When you are prompted for the password, select I Forgot, and then reformat the cartridge using the steps we just described in the previous paragraph.

**Mixing 2GB cartridges with 1GB drives.** If you own an older 1GB model of the Jaz drive, don't blame the drive if it keeps ejecting the 2GB cartridges you insert. Make sure you are using only the 1GB cartridges with the 1GB drive. The 2GB drives will accept both types of cartridges.

**Emergency eject.** Cartridge stuck inside? Forgot to eject a cartridge you need when you turned off the computer? Or, perhaps a power failure is responsible for trapping your cartridge inside. Although it is not the preferred method of ejecting cartridges, you can remove the cartridge manually. First, turn off the power to the Jaz drive and your computer. Locate the small emergency eject hole on the front of your Jaz drive. Straighten a paper clip and insert the end of the paper clip into the hole. Push the paper clip into the hole until the cartridge pops out.

■ **ORB Drives.** ORB drives by Castlewood Systems (408/956-2500; http://www.castlewood.com) can store 2.2GB per cartridge, so not only can they offer more storage than a Jaz drive, but they also costs much less. ORB drives can be found for $140 and cartridges cost about $27 each in a three-pack. That's similar to the price of a Zip drive, but for gigabytes of storage and only one cent per megabyte. That's one of the best storage buys available.

ORB drives use **MR (magnetoresistive)** technology that allows for a large concentration of data on the 2.2GB ORB cartridges. It has an extremely fast maximum transfer rate of 12.2MBps that beats the Jaz drive, making it officially "video-ready," so there's no worry about the drive dropping frames and creating choppy images when you play back your video. There are a few other things, however, that ORB drive users should worry about (a little).

**The mysterious IomegaWare override.** In some instances, ORB owners may click their ORB drive icon and instead of seeing the ORB software display on-screen, the IomegaWare software appears on-screen. If you have ever installed an Iomega drive on your computer, you may experience this problem because early versions of the IomegaWare software occasionally override the ORB software.

To resolve the problem, you must either uninstall the IomegaWare software, or you should download the current version of the software from Iomega's Web site. This should solve the override problem. Now you should be able to use your ORB Tools software.

**USB considerations.** If you've purchased a USB ORB drive to operate on your DOS, Win95, or WinNT computer, you're going to have to upgrade. Unfortunately, the USB version of the ORB drive can't operate in Windows versions prior to Windows 98, even if you do have a USB port. This happens because ORB USB drives are only compliant with USB version 1.1 specifications or higher.

To use your ORB USB drive, you will have to upgrade your Windows operating system or return the USB drive for another drive type, such as a parallel or EIDE (Enhanced Integrated Drive Electronics) drive.

**Varying drive letters.** Sometimes your ORB EIDE drive may appear with one drive letter, such as D:, and other times, it may appear with another drive letter, such as E:. When you boot the drive containing the cartridge Castlewood packaged with the drive, the drive might appear to use the drive letter E:. However, when the drive does not contain a cartridge, it appears as the D: drive.

If you want to change drive letter assignments permanently, you need to use the Device Manager. Click Start, Settings, Control Panel, and double-click System. After you click the Device Manager tab, select the Disk Drives option by clicking the plus sign (+) next to it, then select your ORB drive by double-clicking it, and click the Settings folder. Locate the Reserved Drive Letters area. Set the Start Drive letter option to a letter that is not currently being used from the list. The drive letters after the Start Drive letter will adjust accordingly.

Castlewood recommends that you follow the scheme of how the drives were assigned for your PC. The primary master drive should be C:, followed by any of its partitions, then the primary slave, the secondary master, and then the secondary slave drive. So, your primary master hard drive would be C:, and if your ORB drive is set as the primary slave (and there are no partitions to your master drive), it should be D:. Once you restart your PC, your ORB drive should display the drive letter you specified.

**Emergency eject.** If your cartridge is stuck inside your ORB drive because you forgot to remove it before you shut off your computer (or because of some other reason), there is a way to manually eject cartridges from the drive.

First, turn off the PC and drive, then wait 30 seconds (per Castlewood's recommendation). Locate the tiny emergency eject hole on the front of the drive. Straighten a paperclip and insert one end of the paperclip into the hole. Push the paperclip into the hole until the cartridge ejects.

■ **Getting Help.** If your questions go beyond the scope of this article, don't hesitate to contact the technical support departments of your cartridge drive manufacturers. Most offer help over the telephone or via their Web sites. By accessing their sites, you can check FAQs (frequently asked questions), download software and driver updates, or e-mail a question to technical support for one-on-one help. LS

*by Cindy Krushenisky*

## Where Are They Now?

The market for "big floppy" drives is quickly shrinking. One example of this is that Imation, manufacturer of the 120MB SuperDisk drives, is stopping the sale of consumer SuperDisk drives. Other popular products, such as the SyQuest drive line, already dropped out of the marketplace more than a year ago.

Competition is fierce among cartridge drives. Moreover, competition from optical drives, such as CD-RW (CD-rewriteable) and DVD (digital versatile discs) drives, is staggering. These drives store information on discs through optical means that use lasers for a longer storage life.

However, until a recordable optical drive that can store big amounts of data similar to the 2GB Iomega Jaz and the 2.2GB Castlewood ORB drives becomes available, there will be a demand for cartridge drives. These drives can hold large amounts of data and can access and save data quickly. This makes them ideal for storing large multimedia files, video files, audio files, presentations, and spreadsheets. They also work well for hard drive backups.

# Tape Drives

## Fine-Tune The Process Of Saving Data

With hard drives getting bigger and bigger, the importance of regularly backing up your data to tape continues to grow. Likewise, so is the significance of making sure you can recover data from one of those tapes that you've been religiously creating.

■ **Tape Media.** There are several versions of Travan tape media available, from TR-1 to TR-5. Depending on your drive, each version is certified for a particular uncompressed and compressed data capacity. For example, TR-4 tapes have a 4GB uncompressed and 8GB compressed capacity, while TR-5 tapes have a 10GB uncompressed and 20GB compressed capacity. Current 4mm DATs (digital audio tapes) are listed as DDS-2, DDS-3, and DDS-4, and store 8GB, 24GB, and 40GB, respectively.

Travan tape drives tend to be about one quarter the cost of a comparable capacity DAT drive; however, the relative media costs are just the opposite with TR-5 tapes at more than $40 each and DDS-3 tapes at $18 each (when purchasing tapes in quantity). When you consider that a complete backup strategy can require up to 25 tapes, DAT comes closer to Travan in total cost when you take into account both the drive and media.

There are a couple of other important media issues to consider in advance to save yourself from some troubleshooting questions later on. First, there aren't any data recording standards in the Travan world. Every drive manufacturer and backup program uses a different format when writing tapes. If you upgrade to a higher capacity Travan drive using the same software, you can generally read your old tapes, but you usually can't write to them. With DAT tapes, the format is the same for all manufacturers, and there are consistent standards for all capacities. Most DAT drives can read and write to older format tapes, so if you upgrade, you can continue to use your old tapes even if a different program writes to them.

Failures of the initial sectors are the most common and deadly for Travan tapes. So, for Travan drives especially, remove the tape after the backup and put it in a fireproof safe. Whenever you reboot a system that has a Travan tape drive with a tape inserted, the drive shuffles the tape. This is considered one use of the tape, which reduces its total life and causes significant wear on the beginning of the tape. Follow the drive manufacturer's instructions and periodically clean the tape drive recording head. Some tape drives work with a cleaning cartridge, which you may need to purchase separately. Others drives require manual cleaning.

■ **Installation Checklist.** If you purchased a computer that didn't have a tape drive installed, you can add either an internal or external drive. Depending on the manufacturer, drive capacity, and data transfer rate, you could have a parallel port, ATAPI (Advanced Technology Attachment Packet Interface), IDE (Integrated Drive Electronics), or SCSI (Small Computer System Interface) connection to the tape drive. Internal drives are generally less expensive than external drives, but internal drives require a little more know-how to install. Regardless of what type of tape drive you have, or whether you've installed the drive internally or externally, here is a checklist to follow if your drive doesn't work.

1. Insert a tape in the drive. Does the LED (light-emitting diode) flash on or is the drive activated?

No: If it's an external drive, make sure it's turned on. If you installed a new internal SCSI interface card, make sure the card is firmly inserted. (*NOTE: Before opening a computer case and touching any of its internal components, make sure you get rid of any built-up static electricity by touching the outside of the computer metal case.*) Next, access the Device Manager (Start, Settings, Control Panel, System) to verify that Windows indicates the interface is working properly. Make sure that the SCSI ID for the interface and each device on the interface is unique, and the last device on the SCSI daisy chain is properly terminated.

Then, make sure the power and data connectors are firmly attached. On a Travan drive with a tape installed, does the tape shuffle when you reboot? If it does, you have good power and data connections. But if you're still having problems, check the drive manufacturer's Web site for more diagnostic tips. You may need to call technical support or return the drive if the problem is not resolved.

Yes: Continue.

2. As your system boots up, does the tape drive appear on the list of recognized devices?

No: Verify everything listed in Step 1.

Yes: Continue.

3. If your tape drive came with diagnostic software, does the diagnostic tool detect the tape drive and complete all tests successfully?

**No:** Verify that the correct drivers are loaded. You may need to go to the drive manufacturer's Web site or Microsoft's site to get an updated driver for the tape drive and your operating system. If you have a SCSI drive, make sure the correct SCSI driver is installed for the SCSI interface. Check the SCSI IDs and termination again. In addition, be sure your backup software works with that tape format. If necessary, check the backup software developer's site or the tape drive manufacturer's site for more diagnostic tips.

**Yes:** Continue.

**4.** Does the tape drive work for a small test backup?

**No:** If you haven't checked this before, verify that the correct drivers are loaded and you have the most recent version of the backup software. You may need to visit the drive manufacturer's site or the software developer's site to download updated drivers, software patches, or an updated version of the software. If this still doesn't resolve the problem, try a different tape and/or contact the drive manufacturer or software developer.

**Yes:** Your tape drive passes inspection and is ready to use.

■ **When You Can't Restore.** Nothing is more frustrating than conscientiously performing backups, assuming that you've protected yourself from disaster, and then finding out that you can't restore data from the tape with the version of the file you need. There are many reasons why a good tape suddenly goes bad, including: dirt or debris corrupt the tape or the tape drive; tape cartridges become unspooled or physically damaged; the beginning of the tape indicators becomes ruined; and data errors reside on the critical initial sectors of the tape. Some of these problems are easily recoverable, while others require professional assistance.

If the tape isn't physically damaged, you can try using a cleaning cartridge to clean the tape drive heads. There are several tape head cleaners made specifically for tape drives with instructions about how to use them.

Try a small backup and perform a restore using another tape to make sure the drive is working properly (restore to a different folder and compare files). Make sure you do this with a tape that doesn't contain critical data.

If the drive is working correctly, then "re-tension" the tape you can't read. Do this at least three or four times. Most backup programs have a menu selection for re-tension. Try the restore again. If it fails, see if there is an older version of the files you need on another backup tape. Perhaps you can recover most, if not all, of the information you need by using the older tape instead. For more details about recovering your data, see "Data Rescue Missions" in this issue.

■ **Avoiding Data Disaster.** To help ensure that you can recover from a data disaster, maintain a consistent backup schedule. Many backup programs let you choose when they should perform backups so that the process runs automatically and all you have to do is change tapes. Keep multiple backups on hand. Put on-site backup tapes that aren't currently in use in a fireproof safe, and store a weekly or monthly backup tape off-site. This critical step is often ignored, but we can't stress it enough. Rotate the off-site backup periodically (weekly or monthly), so it isn't too old. For more information about backups, see "Get It Back" in this issue.

Finally, make sure you periodically verify that your tape drive is functioning properly. Perform regular short test backups and restore operations. Once you have your backup tape drive installed and operating smoothly with scheduled backups, there are few things you have to do other than rotate tapes. Now that's the type of troubleshooting we all can handle. LS

*by Jay J. Mahler*

## Backup Bloopers

If your backup fails, there are several steps you can take to help determine the cause.

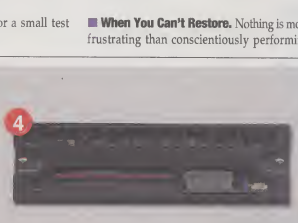
**1.** Many backup programs write to a log file. Check the backup program to find out where the log file is, and then check it to see if there are specific error messages that will help you resolve the problem.

**2.** Make sure your tape was completely inserted and wasn't write-protected. To write data, the tab must be write-enabled (closed).

**3.** Make sure you have the correct type and capacity

tape to perform a backup on your drive. To find out what type of tape a drive can write to, see its manual. Even though your drive may be able to read a particular type of tape doesn't mean that it can write to that tape. The manual should clearly state what tapes the drive can read/write to or read only. In addition, most drives also come with one blank tape.

**4.** Go through the "Installation Checklist" section in the main portion of this article and make sure your drive passes all of the tests. For example, one test we discuss in the checklist states that the last SCSI (Small Computer System Interface) device on the cable must be terminated.



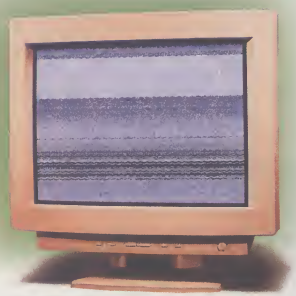

Many new SCSI devices have a setting to automatically determine whether they require termination. If yours doesn't, you may need to set a jumper or plug in a physical termination connector. A typical internal SCSI tape drive has connectors such as these (see the photo above).

**5.** If your drive passes the small test backup and the problem occurred with an unattended backup, try manually running the same backup. Manual backups often provide better error messages.

**6.** Finally, try a different tape and/or check the tape drive manufacturer's Web site or the software developer site for more diagnostic tips. If necessary, contact the drive manufacturer or backup software developer for technical support.

# Monitors

## Make Your Computing Environment Picture-Perfect



A monitor is an easy thing to take for granted. It's generally as reliable as a workhorse. You only realize how much it means to you when it breaks down—especially if there's no image whatsoever on the screen. Without the feedback a monitor provides, you can't work on the presentation that's due at the end of the day, you can't access your bank accounts online, and you might miss a friend's e-mail inviting you to dinner.

**Problem Areas.** There are six general places where monitor problems can occur:

1. the power source
2. the power cord or connections
3. the video cable that connects the monitor to your computer
4. the video card that runs your monitor from inside your PC
5. display settings that you configure in the Microsoft Windows operating system
6. the monitor itself

You can approach many problems the same way you would deal with a TV set that's acting up. Simply secure a loose power cord or cable connection or fiddle with the control buttons on the monitor. Seldom is the problem with the video card, unless there are compatibility issues. (More about these later.) Video cards control and interpret images that your CPU sends to the monitor, and they rarely go bad. Often the culprit is one or more display settings, which are easy to fix.

If the problem is inside the monitor, take it to a repair shop or consider replacing it. Unless you're an electrician or you have a death wish, never open up a monitor. Inside are some really serious voltage hazards, sufficient to cause injury or death even when the monitor isn't plugged in. However, there are a few problems you can solve without lugging your monitor to a technician. We've provided some common problems with tips for troubleshooting them.

**Monitor Mishap.** Your monitor worked fine with your old computer, but it doesn't work at all with your new one. Chances are, your monitor was probably so reliable that it would have seemed silly to buy a new one when you upgraded your computer. But newer computers and older monitors don't always work well together. "One of the most common problems with monitors is incompatibility," says Scott Martin, store manager for CompUSA in Omaha, Neb. "The video card inside your computer that powers the monitor is too good for the monitor."

New video cards are built with high refresh rates (a Hertz setting that determines how fast your monitor renews content) and resolutions that make 3-D games, DVD video, and the whole experience of computing more fun and satisfying. But their demands are such that even newer low-cost monitors are incapable of running them. "If you have a really good video card, and you set a refresh rate at 90 or 100Hz, and your monitor can only handle 75Hz, it can kill your monitor," Martin says. "The only solution is to buy a new monitor."

**Monitor Won't Turn On.** When your monitor won't turn on, the first thing to do is make sure it is plugged in. If it still doesn't turn on, and you don't hear the familiar sound of the monitor coming to life or see the power indicator button light up, don't fret. First, you need to check out a few more obvious things.

1. Try the monitor's power switch; someone may have turned it off.
2. Make sure the power cord plugs securely in the surge protector and/or electrical outlet, and in the monitor itself.
3. Test the outlet by unplugging the monitor and plugging in another appliance.
4. See if the monitor has a blown fuse. Some older monitors have a fuse in the back, which you can safely replace without opening the monitor. If the second fuse blows, take the monitor in for repair.

If none of these things work, your monitor may be in sleep mode, which happens after so many minutes on inactivity. Just clicking the mouse or pressing a keyboard key should wake it up.

If you don't like the sleep setting, which is also known as the hibernate or standby mode, you can change it or get rid of it entirely. Right-click a blank spot on your Desktop and select Properties from the pop-up menu. In the Display Properties window, click the Screen Saver tab. Then, click the Settings button in the Energy Saving Features Of Monitor section. In the Power Options Properties dialog box, click the Hibernate tab to adjust the hibernation settings, or click the Power Schemes tab to adjust how long you want your system to be idle until it goes into standby mode. You also can disable both of these features from their appropriate tabs.

## The Old, Gray Monitor

Still hoping to coax a little more life out of that old monitor? You might be able to.

One problem common to older CRTs (cathode-ray tubes) is that they lose brightness so the on-screen images become dim. Adjust the brightness and contrast controls, and lower the lighting in the room, especially overhead lights that shine directly on the screen. If that doesn't brighten the image sufficiently, a repair shop might be able to help. Some technicians may be able to make adjustments to improve your monitor's images; however, there is no guarantee. (On the other hand, it might be time for a new monitor, especially if there are other symptoms, such as blinking.)

Another common symptom found in older monitors is that the entire image appears as though you're viewing it through a colored filter. This means there has been a breakdown in the signal of one of the main colors—blue, green, or red—between the video card and the monitor. The problem could be in the monitor itself or in the cable that connects the monitor to the PC. On most monitors, the cable is built in, so you'll need to take it in for repair.

Another problem with old monitors is whining. You might be able to placate it by reducing its brightness or refresh rate. On the Settings tab where you choose color and resolution values (in the Display Properties dialog box), click the Advanced button. Select the Adapter tab, and using the pull-down menu, set the Refresh Rate for Optimal (60Hz) or the highest Hertz setting specified in the monitor manual. Exceeding the recommended Hertz setting can distort the display and even damage hardware. If hissing and popping noises get louder, you may need a new power cord or a trip to the repair shop.

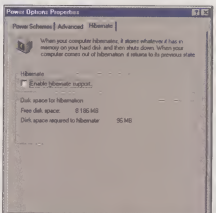
You might be able to boost an older monitor's performance with an updated video card. A new video card can provide better color and resolution and faster refresh rates. Just make sure the new video card is compatible with your old monitor.

**Playing it safe.** If that isn't the answer, reboot your computer and press the F8 key when it starts up again. Then, type the number for the Safe Mode option and press ENTER. This will start your system in Safe Mode, which lets your computer launch the Windows GUI (graphical user interface) with minimal hardware support so you can solve any configuration problems.

If the monitor screen remains black when you run Safe Mode, the problem is your monitor. If the screen turns on while entering Safe Mode, you'll be able to go into the Display control panel and adjust its settings. Right-click a blank spot on your Desktop and select Properties from the pop-up menu. In the Display Properties dialog box, click the Settings tab. First, notice the resolution in the Screen Area setting. It should conform to recommendations for your monitor. If you need to change a setting, simply move the slider to the left or right.

To set the Refresh Rate, click the Advanced button on the Settings tab. Select the Adapter tab and the click the down arrow in the Refresh Rate field. Select the Optimal (60Hz) setting or select the setting specified in your monitor's manual. Then, click the Performance tab. If Hardware Acceleration is on the highest setting, you may need to lower it by moving the slider. Click OK when you finish to implement your changes.

**Strobe Lights.** Even if your monitor is showing images, that doesn't mean it is running perfectly. Sometimes you may see a strobe-light effect on your monitor. It is kind of like seeing a ceiling fan running in the background, Martin says. "Usually the cause is that your refresh rate is too high or you need to degauss the monitor, which takes about two seconds." Degaussing removes static electricity buildup in your monitor by demagnetizing the CRT (cathode-ray tube) when images become distorted as a result of exposure to magnetic fields. Your users' manual or on-screen display will tell you how to do it.


Power Options Properties
Power Schemes
Advanced
Hibernate
When your computer hibernates, it stores whatever it has in memory on your hard disk and then shuts down. When your computer comes out of hibernation, it returns to its previous state.
Hibernate
Enable hibernate support
Disk space for hibernation
Free disk space: 6186 MB
Disk space required to hibernate: 96 MB
OK
Cancel

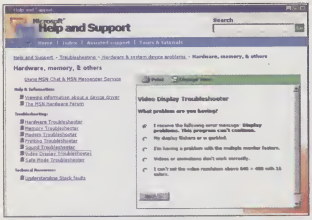
**If you don't want your system to go into hibernation mode, you can easily turn it off using the Power Options Properties dialog box.**

**Discolored Screen.** If, no matter what you display on your screen, there is one spot that is discolored, you may have a problem with your CRT. The CRT is the base component of most monitors and TV sets. It has a vacuum tube coated with phosphors that emit light when bombarded with electron beams. Portions of the screen may become discolored if the CRT becomes magnetized. It's easy to fix using your monitor's degaussing function. You can prevent the problem from recurring by removing anything electrical or magnetic, such as televisions, radios, or unshielded speakers, from the vicinity of your monitor. (*NOTE: Speakers designed for use with computers have shields preventing electromagnetic leaks.*)

**Image Problems.** Interference can cause more than just the discoloration of your screen, it can also cause on-screen images to jump or vibrate. If your monitor is near other electrical appliances, unshielded speakers, or fluorescent lights, these items may be causing some sort of interference. Monitors are so sensitive to electromagnetic fields that even moving them suddenly or leaving them running too long can cause problems. If you do have nearby electrical appliances, move the monitor or the appliances to see if the problem goes away. There may be a degaussing button on the monitor, or your monitor may automatically degauss itself when it's turned on, in which case, you can simply turn it off and on.

Another problem with on-screen images is that they sometimes become distorted. If images on your screen are out of focus or look fuzzy, you probably have your resolution set too low. To adjust your resolution settings, follow our earlier instructions for changing this.

If your image flips or scrolls (horizontally or vertically), then make sure the cable from the


Microsoft
Help and Support
Search
Home | Index | Assisted support | Tours & tutorials
Help and Support > Troubleshooting > Hardware & system device problems > Hardware, recovery, & others
Hardware, memory, & others
Video Display Troubleshooter
What problem are you having?
I receive the following error message: Display problem. This program can't continue.
My display flickers or is garbled.
I'm having a problem with the multiple monitor feature.
Videos or animations don't work correctly.
I can't set the video resolution above 640 × 480 with 16 colors.
Next

**The Help feature in Microsoft Windows operating systems offers monitor troubleshooting tips and solutions.**

monitor to the PC is securely connected. You should also check to make sure there are not bent pins in the connector. Depending on your monitor model, this may be a separate cable that you can easily replace. However, it also could be integrated into the monitor.

**Screen Flickers.** If your screen is doing other strange things, such as flickering, chances are, you need to adjust the monitor's refresh rate. The image on your screen is the result of an electron gun rapidly firing a beam at pixels one line at a time, from top to bottom. Refresh rate is the speed of that cycle, so if your monitor's refresh rate is 60Hz, it cycles through all the pixels 60 times per second. The best performance comes from using the highest setting your monitor allows. Follow our previous instructions to reset this rate.

**Strange Sightings.** Every once in awhile, you may see some strange things on-screen. When you see images that bow in and out, become blurry, or have strange horizontal lines, don't worry. There are some simple reasons why these things are happening. Even if your screen is all white, you can probably fix the problem.

**Horizontal lines.** If you see two thin horizontal lines on-screen, you're simply seeing wires that are part of the monitor's infrastructure. Using a darker background may minimize the lines. In most cases, you can use the controls on the front of your monitor to adjust the brightness of your screen.

**Bowing images.** If on-screen images appear to be bowing in or out, there is a simple solution. On newer monitors, you can fix this problem using the pincushion adjustment on the front of your monitor, which is among the other monitor control buttons. You may also be able to correct it by lowering the image resolution.

**White out.** If your screen is all white, the monitor probably isn't getting a signal from the video card. Make sure the cable is securely connected to the monitor and PC. Check the cable connectors for bent pins, too. If possible, connect the monitor to another PC. If it works, the problem is with the video card. Check to see that Windows recognizes your video card. Right-click a blank spot on your Desktop and select Properties. In the Display Properties dialog box, click the Settings tab. Note the name of your video card under Display. If it's not the correct card, click Advanced, then click the Adapter tab. Click the Change button and follow the instructions in the Install Updated Drivers Wizard, which will look for the correct driver and install it. (In Windows 95, use the Change Display Type button in the Display Properties Settings tab.)

**Blurry images.** If your on-screen images are blurry, you may be able to adjust a focus control on your monitor. However, the problem could be a faulty video cable or monitor.

**Screen Saver Dilemma.** Another thing that often causes confusion is whether to use a screen saver. One friend says you need a screen saver to prevent burn-in, and another says that only applies to older monitors. Who's right? **Burn-in** is rarely an issue for today's monitors. But using a screen saver or setting your monitor to rest after periods of inactivity can help prolong the life of your monitor. Over time, the phosphors in pixels darken and lose their ability to emit light. Pixels are the basic unit of an image on a monitor. Each pixel is a triad of red, blue, and green dots of phosphor that glow when activated by an electronic beam. It takes hundreds of thousands of pixels to make up the image you see on your screen.

Get in the habit of turning your monitor off overnight. "The most important thing you can do to prolong the life of your monitor is to turn it off when you're not using it," Martin says. Unlike a PC that can age faster by being turned off and on, he says a monitor's CRT will last longer if you turn it off when you're not using it because it has a limited number of hours of life.

**LCD Letdowns.** LCD (liquid crystal display) monitors, as opposed to monitors that use CRT technology, present some different issues for users. The liquid crystal is sandwiched between electrodes, giving it the ability

## Technical Help

If you need help troubleshooting a problem with your monitor, many manufacturers have FAQs (frequently asked questions) and other support information on their Web sites. Of course, if you can't see anything on your monitor, a Web site is useless. In that case, maybe you can call a friend who will look up the Web site for you, or you can call the manufacturer for phone support. Make sure you have the model and serial number of your monitor handy.

**Acer**
(800) 452-2237
(408) 432-6200
http://www.acer.com

**KDS USA**
(800) 283-1311
(714) 379-5599
http://www.kdsusa.com

**NEC**
(800) 632-4662
(630) 467-4363
http://www.nectech.com

**Packard Bell**
(800) 733-4411
http://support.packardbell.com

**Panasonic**
(800) 726-2797
http://www.panasonic.com

**Sony**
(888) 476-6972
(408) 922-0699
http://www.sony.com

**ViewSonic**
(800) 888-8583
(909) 869-7976
http://www.viewsonic.com

***The range or quality of your color display is determined by your monitor's capabilities, the video card's memory, and the display's resolution.***

to bend and twist light to create images. The images are sharper, but there is only one setting for resolution, such as 1,024 x 768 pixels. Consequently, the image may not fill the screen area, leaving a black border. Your computer or monitor probably has an adjustment that will enable you to stretch the image, but doing so may impair the appearance of images, especially text. In addition, make sure Windows recognizes your monitor as a flat panel or LCD.

**Dead pixels.** A common and serious problem affecting LCD monitors is dead or black pixels. "When pixels go bad, there's nothing you can do about it," Martin says. When buying an LCD notebook or flat-panel monitor, inquire about the manufacturer's replacement policy regarding dead pixels.

**Adjust Display Settings.** You can troubleshoot many monitor problems and boost your monitor's performance by making adjustments to the settings in the Display control panel in Win95/98/Me. There are a number of controls in the Display Properties dialog box, but the ones most often related to troubleshooting are under the dialog box's Settings tab.

Right-click a blank spot on your Desktop, then click Properties. In the Display Properties dialog box, click the Settings tab. After choosing the settings in one window, click Apply before going on to the next window. When you finish, click OK. If prompted, restart your computer to activate the new settings and prevent possible conflicts with the software you're running.

If you need to make adjustments to your resolution, go to the Screen area on the Settings tab and move the slider. In general, a 15-inch screen will have a resolution of 640 x 480 pixels, a 17-inch screen will have 1,024 x 768 pixels, and a 19- or 21-inch screen will have resolutions of 1,280 x 1,024 pixels or 1,600 x 1,200 pixels.

The range or quality of your color display is determined by your monitor's capabilities, the video card's memory, and the display's resolution. The more colors, the better the image. It gets a bit confusing because it sounds as though 256-color capability is higher than 16-bit (also called High Color), but the opposite is true. High Color displays more than 65,000 colors and 24-bit True Color displays more than 16 million colors. Having 2MB of memory in your video card will support 24-bit color at 800 x 600 pixels, 16-bit color at 1,024 x 768 pixels, and 8-bit color at a 1,280- x 1,024-pixel resolution.

Choose your color settings in the same window as the resolution settings. Take care not to exceed the capabilities of your monitor because you could damage it. If the system refuses to accept the settings you chose, one of two things is happening. Either you've chosen color and resolution settings that are too powerful for your video card or monitor and the system is protecting them, or your Hardware Acceleration setting is too high. To adjust the Hardware Acceleration setting, click the Advanced button in the Settings tab of the Display Properties dialog box. Then, click the Performance tab. Decrease the acceleration of your graphics by moving the slider bar toward None. Click the OK button to finish.

**Helpful Hints.** If you are still having monitor problems, turn to Microsoft for some help. You can find more troubleshooting tips in the Help feature of Windows operating systems. Click the Start button and select Help. From there, search for "monitor" or "troubleshooting" to find helpful pointers. LS

*by Leanna Skarnulis*

## Check Connections & Settings

Your monitor is not working properly, and you are at your wit's end trying to figure out what is wrong with it. Before loading it up and taking it in for repair, there are a few things you should check to make sure it's not going to be an unnecessary trip.

**1.** Check the power cord, the power cord's connections to the monitor and computer, and the power source, including the electrical outlet and surge protector.

**2.** Check the cable that connects the monitor to the computer. Are the connections

secure? Are there kinks in the cable or are you using a cable extender, either of which could scramble the signal?

**3.** Adjust various monitor settings, using the buttons on the front of your monitor. You can adjust brightness, contrast, moiré, and other settings. These are controlled with knobs, dials, or on-screen display buttons.

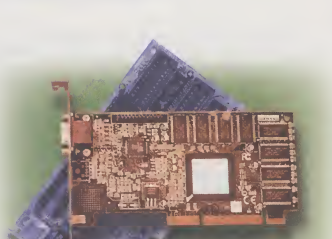
**4.** Check the display settings in your Microsoft Windows Display control panel.

**5.** If you have access to a PC other than the one your monitor is using, you can verify that the problem is with the monitor before taking it in for repair. Connect it to the second PC. (This is usually the first thing a service technician would do.) □

# Video Cards

## Solutions For Bad Images

Nobody should have to live with a monochrome screen, fuzzy image, or outdated graphics. The latest video card technology has made computer images as sharp as television images. Although image quality is often overlooked as a place to upgrade and troubleshoot, maximizing the potential of your video system will make every task easier on your eyes.



**Optimal Images.** Obtaining an optimal screen image requires up-to-date equipment at each level of your computer's video system. This system has three elements:

1. **The video card, also called a graphics card or video adapter.** It is a piece of hardware connected to the motherboard, where it creates electric signals and sends them to be displayed on the monitor.
2. **A device driver.** This is software that directs the video card to send correct signals to the monitor.
3. **The monitor itself.** It is connected to the video card with a cable.

Even the finest monitor will render mediocre images if it is connected to a low-quality video card. Video cards, in turn, depend on the right driver and proper settings to function properly.

If it's been too long since you last replaced your video card or driver, you will be pleased by the advancements manufacturers have made in recent years. Video systems are getting faster, delivering sharper images, and giving users more tuning options.

Unfortunately, video trouble has not disappeared. Problems like a flickering screen, blank screen, or disappearing cursor still occur with new graphics systems. If you can't solve these problems by troubleshooting your monitor (For more information, see "Monitors" in this issue.), your video card may to blame.

**How Video Cards Work.** Troubleshooting these problems begins with understanding how the video card works. Laptops have an integrated card, which means it is a part of the system board and thus not removable. Most PCs have a removable card, also called an expansion card, which is preferable because it can be replaced and upgraded. The most basic video cards let the computer process only 16 colors, while the most expensive cards create millions of colors. More colors produce a clearer image on the monitor, but some monitors may not support more than 256 colors. All video cards consist of three components:

1. **A video chip.** This chip creates signals that eventually become images on the screen.
2. **RAM.** This can be EDO (Extended Data Output RAM), SGRAM (synchronous graphics RAM), VRAM (video RAM), or regular RAM. The video card must have its own memory to form complete screen images.
3. **RAMDAC (RAM digital-to-analog converter).** This is a chip that converts signals from digital to analog form. PCs work with digital data and monitors work on analog signals.

**Fixing The Problem.** Here, we look at solutions to some of the most common problems associated with video cards.

**Problem:** I installed a 3-D video card, but my computer still shows only 2-D.

**Solution:** Even though you removed your old card, your PC is still using the old card's drivers.

Go to the Start button, click Settings, and double-click Control Panel. Look through the Control Panel and double-click the System icon. Select the Hardware tab, then the Device Manager button, and click the Display Adapters icon. Your system will now tell you which driver it is using. If it lists your old video card, click on its name, then the Driver tab, then Uninstall. Once your old driver is disabled your system should start referring to the new one. If not, you can manually direct the PC to install the new driver using the steps you just walked through to uninstall the old one.

Depending on the version of Windows you are using, it may take a few minutes of exploring to find the right icons and tabs in the control panel. Select the Start button and click Help to access the Help Wizard. Microsoft sometimes changes the names and organizations of these tabs. Documentation that came with your PC may lead you to the right place, but it is often faster and easier to look around the control panel on your own.

**Problem:** My screen is flickering.

**Solution:** This problem is very common and is among the easiest to correct. It comes from a vertical refresh rate that is too low. The monitor completely redraws (or "refreshes") the screen dozens of times every second. Refresh rates are measured in hertz, which means "times per second." Most people notice a flicker if the vertical refresh rate is set below 70Hz. Some people don't notice the flicker, but they do develop headaches after a few hours because their eyes are strained by the low refresh rate. If you spend several hours or more each day staring at your screen, your refresh rate should be a minimum of 75Hz to 85Hz. Raise that number if you stare at high-resolution graphics.

The computer usually sets the refresh rate to an optimal setting by default. To change it, go to the Start button, select Settings, then Control Panel. Click the Display icon, select the Settings tab, and click the Advanced button. Selecting the Monitor tab or Adapter tab will tell you your current refresh rate and will let you increase it. (*NOTE: Depending on the video card you have installed, some Advanced options may vary.*) If you make the refresh rate too high, the computer's performance will slow down or the display within the monitor will become smaller.

It's important to read your monitor manual to ensure you are using a compatible resolution so as to avoid damaging the monitor. If you choose a refresh rate setting that is dangerous to your monitor, it will most likely display an error message that says "No Signal." Go back into your operating system and try a lower setting.

**Problem:** I added more memory to my video card, but it doesn't run any faster.

Solution: This is a common misconception. If you're within a very small memory range, like 1MB of Video RAM on a 64-bit video card, increasing the memory to 2MB will increase performance. That happens because having only 1MB restricts a 64-bit card to using only 32 bits, but having 2MB lets the card use all 64 bits.

However, adding video memory beyond 2MB does nothing toward improving performance. It only produces higher resolution images with more texture. The only way to get a faster card is to buy a new one.

If your system has slowed since installation, you might be able to squeeze a little more speed out of it without adding memory or buying a new card by adjusting the hardware acceleration slider. Go to the Start button, select Settings, Control Panel, and click the Display icon. Click the Settings tab and the Advanced button. Click the Performance tab, make sure the Hardware Acceleration slider is set to Full, and click OK. (*NOTE: Your Hardware Acceleration slider may be located in another tab depending on how things are set up with your video card.*)

These steps can vary with different versions of Windows. Explore the Help area or Control Panel or read your manual to find the right dialog box.

**If you need to squeeze more speed out of your ATI's All-in-Wonder 128 Pro video card, you can make an adjustment to the Hardware Acceleration slider.**

**Problem:** Changing certain settings has made my display look worse than ever.

Solution: This happened because making one setting too high or too low will knock the other settings off balance. For example, a high resolution can show more screen area, more on-screen objects, and dialog boxes. But a high

## Troubleshoot Video Card Installations

You've just finished installing a new video card. But now it refuses to boot up and beeps at you with a blank screen. Follow these steps to solve your installation problems.

**1.** Be sure your monitor is plugged in, turned on, and securely connected, and that the brightness and contrast knobs are turned on.

**2.** Before opening the case, turn off your computer and unplug it. Ground yourself by touching the power supply. Open the case and confirm that the video card is properly seated in its slot, firmly in place.

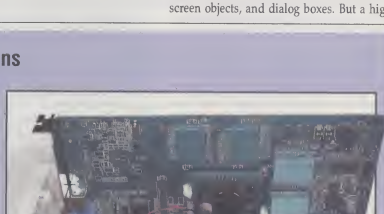
**3.** Check that the cables connecting the video card (called connectors) are tightly connected to the board.

**4.** Make sure the jumper settings are correct. Jumpers are two needle-like pieces of metal connected to the motherboard. Check your motherboard manual to determine the correct settings.

**5.** If your screen is still blank, the card might be defective. Install it in another computer and see if it works. If not, insist on a refund from your retailer.

**6.** If the card does work in another computer but not yours, it may be incompatible with your system. Read the manual that came with the card, as it may list monitors and other hardware that works with this card. Your manufacturer's Web site probably has more information than is printed in the manual. If the card is incompatible, your best bet is to replace one of the components.

**7.** But before spending money on a new card, be sure that incompatibility is the problem. Double-check by reinserting the original card (the one you used before installing the new one). If your system works with the original card, you can be sure the new card is problematic or incompatible. However, if your system now refuses to work with the original card, the computer must have a problem unrelated to either card. This means you probably dropped a screw, loosened a cable, or broke something while trying to install the new video card.




**8.** Another way to narrow down the problem is to listen to the beep codes during startup. The beep codes are a combination of short and long beeps, and it is a way for your BIOS to tell you it has detected a problem with hardware or a configuration. Read the motherboard manual or manufacturer's Web site to learn which beep codes correspond to video card problems.

resolution can slow overall performance and reduce the number of colors your video card can display. Increasing the number of colors, in turn, will increase image quality but will also slow performance and decrease resolution. It is possible to find the right combination by compromising one setting for another.

Most name-brand video cards come with a program to adjust the settings. If yours doesn't, go to the Control Panel, click the Display icon and Settings tab, then adjust from there. To avoid mishaps, read the documentation that came with your monitor to learn its maximum settings.

**Problem:** There's snow on the screen.

**Solution:** There is a good chance your video card is incompatible with your monitor. The card is sending signals, but the monitor is having trouble understanding them. Read the manuals that came with both pieces of hardware. If neither is listed as being compatible with the other, go the manufacturers' Web sites to see if they are listed there as being compatible. (For more information, see the "Troubleshoot Video Card Installation" sidebar.) If your video card doesn't work with your monitor, take it back to the retailer and exchange it. Be sure to read the documentation at the store to make sure the card is compatible with your monitor.

**Problem:** My mouse pointer or cursor disappears when I change the screen settings or click the menu bar.

**Solution:** This is probably happening because your video driver is outdated. Aside from disappearing cursors, an ancient driver could cause a blank screen and many other display problems. Upgrading to the latest driver is free and easy to do by going to the manufacturer's Web site. Manufacturers often release new drivers to take advantage of new programs, new operating systems, and new features. Go to the Web site and follow instructions to download and set up the driver.

Once your new driver is installed, your system will use its graphics card at its highest capacity. An updated driver should automatically override the old one. If it doesn't, follow the instructions above on disabling the old driver (under "I installed a 3-D video card, but my computer still shows only 2-D.")

If you are not using a name-brand card, the manufacturer may not have updated drivers and probably will not even have a Web site. In this case, you can still update your driver by going to the video chipset maker's site and downloading a driver from there.

It can't hurt to update a driver, but if you choose, there is a simple process to find out if the driver is the problem. Start by loading Windows' standard VGA (Video Graphics Array) or SVGA (Super Video Graphics Array) drivers that come with the system. On the Desktop, right-click My Computer, Properties, then Device Manager, View Devices By Type. Click Display Adapters, then select your display adapter. Choose the Driver tab and select Update Driver, Display a List, and Show All Hardware. Select Standard Display in both the manufacturers list and models list. If the problem disappears, your driver was the cause. LS

*by Raya Tahan*

## Problems Specific To Video Capture Cards

Video capture cards turn video from a camcorder or VCR into video that can be displayed on a PC. This allows home-movie directors to add scrolling titles, dramatic background music, voice-over narration, special effects, and fade-to-black transitions between scenes. Perhaps best of all, editing allows users to cut useless footage, string together the best scenes, and arrange them in any order for a fast-paced movie.

Capture cards are an essential component because they get the video into the computer. Because many companies bundle video capture cards along with video-editing software and with other pieces of editing hardware, it's difficult to pin down where the trouble is originating.

Capture cards come in two types. Analog capture devices digitize analog signals from a Hi-8, VHS or other analog camcorder. They dramatically compress the video file to make it small enough to be edited on a home computer. FireWire capture cards work only with digital camcorders with a FireWire interface. FireWire capture cards directly transfer camcorder data onto the hard drive. Since the data is already compressed, further compression is not required. With FireWire cards and cameras, users can create video with no "generation loss" by creating an exact duplicate of ones and zeros.

**Dropped frames during capture.** Video capturing is a job that requires every bit of your PC's power. Disable all screen savers, antivirus programs, fax/modem software, and wallpaper. Because virus scanners constantly scan files in the background, they take precious CPU time and energy away from the capture process. That leads to dropped frames and skips in the movie.

Disable as many background applications as possible. Almost every icon in Windows represents a loaded program eating up memory and CPU time. Go to the Start button, select Run, type **msconfig**, and press ENTER. Msconfig.exe will pop up. Go to the Startup tab, which will show a list of everything that starts up with your system. Disable programs by unchecking them. When you want these startup programs back, run msconfig.exe again and recheck the startup items. With Windows 95, press CTRL-ALT-DEL. Click End Task on as many background applications as possible. (Leave Explorer and Systray on because these are important to keeping the operating system up and running.)

**Error message.** If a message that says "Vertical Sync Error" pops up when you try capturing video, there is a conflict between the capture card and another board installed in the computer. For any piece of hardware to work, it must send an IRQ (interrupt request line) to the operating system. This IRQ asks the system to give the hardware some processing time. IRQs are limited, which means you must make them available if your capture card isn't getting any.

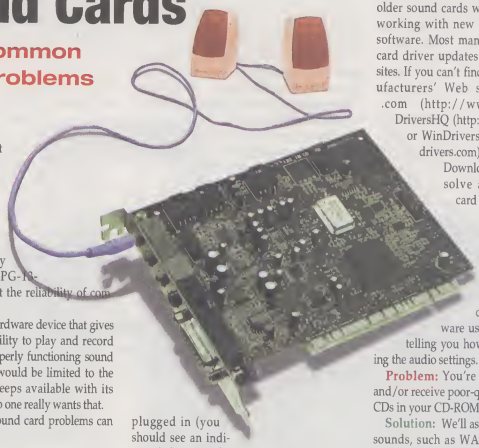
If your capture card's interrupt messages don't work, go into the Setup menu and try a different IRQ. If none of those work, you may need to move the sound card, modem, or another card to a different slot.

If you think you should have an IRQ available by now, but you still get this error message, your system may be locking out IRQs for plug-and-play cards, including your video capture card. Go into the BIOS and make an IRQ available for your capture card by looking for a section called PNP, Plug and Play, PCI or Bus. Either disable Plug and Play or enable a specific IRQ for the card.

If nothing else works, contact the computer dealer or manufacturer for tech support.

# Sound Cards

## Fixing Common Sound Problems



Silence is golden . . . except when the silence is the result of a malfunctioning sound card in your computer. Then the silence is apt to be broken by some unflattering, PG-13-rated comments about the reliability of computer components.

A **sound card** is a hardware device that gives your computer the ability to play and record sounds. Without a properly functioning sound card, your computer would be limited to the primitive-sounding beeps available with its internal speaker, and no one really wants that.

Fortunately, most sound card problems can be solved fairly easily.

**Sound Advice.** Here are some troubleshooting tips for fixing some of the most common problems you'll encounter with a sound card.

**Problem:** Your computer's sound was working great yesterday; today it's doing its best impersonation of a mime.

**Solution:** Determine whether the cause for the lack of sound lies with your sound card or with your speakers.

First, though, let's check some easy-to-fix solutions. On the right side of your Windows Taskbar, look for the speaker icon. If the icon has a red circle and line through it, your system has been muted. Double-click the speaker icon and remove the check mark from the Mute All checkbox in the Volume Control window. You also may need to turn up the volume level.

Determine whether Windows is using your sound card as the default audio device. Click the Start button, Settings, and Control Panel. Double-click the Multimedia icon and click the Audio tab. Your sound card should be listed as the preferred device for playback.

Make sure your speakers are plugged into the correct jack on your sound card. If your speakers require power, make sure they are plugged in (you should see an indicator light on the front of the speaker) and make sure they're turned on. If the speaker has a volume control knob, make sure it's turned up at least to the medium setting.

If no easy solution exists, try plugging headphones into the speaker jack on the sound card. If you hear sound now, the problem probably lies with your speakers. However, if you still hear no sound, it's probably a problem with the sound card.

Once you've determined that your sound card is the problem, read on for potential solutions. If the problem lies with your speakers, then refer to the "Speakers" article found in this issue for more troubleshooting tips.

**Problem:** Your sound card won't work with certain software programs. There is no sound at all or the sound is garbled.

**Solution:** Your sound card's driver probably has become corrupted or may need to be updated. (A **driver** is a piece of software that lets hardware communicate with the operating system.)

Check with the sound card's manufacturer or, if the card was preinstalled in your computer, check with the computer's manufacturer to determine whether new drivers are available. New sound card drivers provide older sound cards with new instructions for working with new types of hardware and software. Most manufacturers make sound card driver updates available on their Web sites. If you can't find the drivers at the manufacturers' Web site, try DriverGuide.com (http://www.driverguide.com), DriversHQ (http://www.drivershq.com), or WinDrivers.com (http://www.windrivers.com).

Downloading a new driver can solve a multitude of sound card problems.

If you don't think the problem is because of an older driver, make sure your audio settings for the software in question are correct. Check the software user guide for information telling you how to manually configuring the audio settings.

**Problem:** You're not hearing any sound and/or receive poor-quality sound from audio CDs in your CD-ROM or DVD-ROM drive.

**Solution:** We'll assume you can hear other sounds, such as WAV files. (If not, see the above tip.) First, make sure your optical drive (CD-ROM or DVD-ROM) is working properly. Try inserting a different audio CD or a CD-ROM disc to see whether the drive is working OK. You can plug headphones into the audio jack on the front of the optical drive. If you hear audio through this jack, the drive probably is working properly. If so, your speakers are most likely the problem.

If the problem seems to be with your optical drive, make sure your optical drive settings are correct under Windows. Click the Start button, Settings, and Control Panel. Double-click Multimedia. In the Multimedia Properties window, click the CD Music tab. Make sure your CD-ROM or DVD-ROM drive letter is marked correctly and the CD Music Volume level is at the middle setting or higher.

Next, check the audio cable that connects the CD-ROM or DVD-ROM drive with the sound card. (You'll have to open the computer case to check this.) If the cable isn't connected tightly or is connected incorrectly, adjust the cable's connectors. If all the cables seem to be connected, you may need to replace the audio cable connecting the optical drive and the sound card.

If you're having problems with poor audio quality from your audio CDs, you may just have a slow CD-ROM drive. If the unit is a few years old, you may want to consider a replacement.

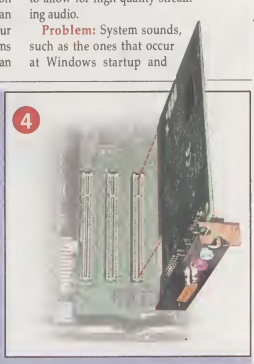
**Problem:** You can't hear streaming music from the Internet, such as Internet radio stations.

Solution: Make sure you have the proper audio player software installed on your computer. At most Internet sites that offer streaming musical files, you will find links to two of the most popular audio players, RealPlayer from Real Networks (http://www.real.com) and Windows Media Player from Microsoft (http://www.microsoft.com/windows/windowsmedia).

Keep in mind that listening to streaming music isn't always an easy proposition, especially over a dial-up Internet connection. (Streaming music files are played in real time rather than being downloaded and stored on your hard drive.) Heavy Internet traffic can cause spotty sound quality. Dividing your system's resources between several programs while trying to run a streaming audio file can cause poor sound quality or audio that starts and stops intermittently.

If you aren't lucky enough to have a broadband, high-speed Internet connection, you may just have to try making your dial-up Internet connection at a different time to achieve better audio quality. Overall Internet traffic just might be too heavy to allow for high-quality streaming audio.

**Problem:** System sounds, such as the ones that occur at Windows startup and

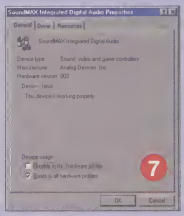



## Installation Woes

You've just finished installing your new sound card and are ready to test it. Unfortunately, no matter what you do, you get no response.

Ah, it's the most frustrating of all installation problems—no response at all. Take a deep breath, keep all sharp objects out of reach, and try the following tips.

**1.** Determine whether the Windows operating system is recognizing the card. When you boot the computer after installation, you should see an Installation Wizard window, which offers to walk you step-by-step through the process of installing the hardware drivers needed for the sound card.




If Windows doesn't recognize the sound card as new hardware, you probably don't have it inserted correctly.

**2.** Make sure the sound card's connector strip is completely seated in your PCI (Peripheral Component Interconnect) or ISA (Industry Standard Architecture) card slot. Once the card is installed properly you should see no more than a sliver of the copper/gold conductor strips on the card sticking above the expansion slot.

**3.** It sometimes can be a tight fit. Try inserting one corner of the card's connector strip into the slot first. Then gently rock the connector strip into place.

**4.** When inserting the card, keep it aligned with the expansion slot. Never wiggle or try to force the card from side to side at a 90-degree angle to the slot; you could snap the card or damage some of the chips.

**5.** Try installing the sound card as far away from other components as possible to minimize potential interference noise.

**6.** Once the card is inserted properly, be sure to connect the sound card to your CD-ROM or DVD-ROM drive with the audio cable. The audio cable usually consists of four thin wires with plastic connectors on either end. One corner of the cable connector usually is notched or labeled, which will help you install it properly on the sound card.

**7.** After checking the interior components for potential problems, it's time to determine whether you have a hardware conflict. Click the Start button, Settings, and Control Panel. Double-click the System icon and select the Device Manager tab. Click the plus sign (+) next to Sound, Video and Game Controllers. Highlight the sound card's listing and click the Properties button. In the Device Status area of the General tab, you'll see a message about whether the sound card is working properly.

If there's an error, you may need to contact your sound card's manufacturer for instructions on changing its settings. You also can try moving the sound card to a different PCI slot.

These tips should solve the common problems you may encounter after installing a new sound card. But, under the worst-case scenario, your new sound card simply might be incompatible with your existing computer setup. If you have problems booting your computer after installing the sound card or if other components also begin behaving strangely, an incompatibility is possible.

In this case, you'll either have to try another sound card or call the sound card's manufacturer to see whether some updated hardware drivers are available to fix the problem.

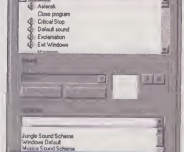
It's also possible the sound card is broken. Perhaps it was damaged during installation, or it may never have worked. Contact the manufacturer or the store where you purchased it to determine your next step.

shutdown, have silenced themselves or are different than what you set.

**Solution:** First, make sure other types of sounds are still playing. If no sounds are playing, try the tips at the beginning of this article.

If other sounds are playing, then several possibilities exist. A prankster may have changed your settings, your system sound files may have been deleted, or a sound scheme may have been selected inadvertently.

System sounds are accessible by clicking the Start button, Settings, and Control Panel. Double-click the Sounds icon. In the Events area of the Sounds Properties window, you should see some speaker icons located to the left of some of the system events. If you see no speaker icons, all of your system sounds have been reset. You can manually reassign the system sounds by highlighting an event. Then select a sound from the Name text menu or by clicking the Browse button and finding the file you want.




**Use the Sounds Properties window to set system sounds.**

In the Schemes text box, you can select a sound scheme by which Windows will assign similar sounds to various system events. If someone has selected a new scheme for your computer, your system sounds will have changed. The No Sounds scheme will silence all of your system sounds.

**Problem:** Your audio quality doesn't seem to be as good as it should be. The sound is sometimes scratchy.

**Solution:** Download the latest driver for your sound card as described earlier. This should fix most of these types of problems.

If a new driver doesn't help, you may have an older sound card that simply can't reproduce high-quality audio files. If after making several tweaks, you can't achieve the audio quality you want, you may need to upgrade to a newer sound card.

Poor-quality audio also can be caused by speakers instead of the sound card. Most computer speakers aren't high-quality speakers, which could cause some poor audio. If you have the highest-quality sound card, it won't do you much good with a pair of cheap computer speakers.

If, however, you've upgraded to a high-quality set of at least four speakers for surround sound (four channels), you'll need a sound card that supports four channels. Newer sound cards contain two line-out jacks to handle four channels. You can run four speakers from a sound card with one line-out jack, but the quality won't be as high.

**Problem:** Your audio recordings are of a poor quality or don't work at all.

**Solution:** While having a high-quality sound card is important for making high-quality recordings, other aspects of your computer can have a major effect on your recordings.

Make sure you have a high-quality microphone to create good recordings; the tiny microphone that shipped with your computer probably won't cut it.

Under Windows, be sure to set your recording quality at the highest possible level. Click the Start button, Settings, and Control Panel. In the Multimedia Properties window, click the Audio tab. In the Recording area, click Advanced Properties to set the slider bars for the highest-quality recordings.

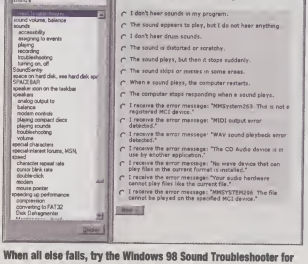
Finally, if you can't make any recordings at all, make sure your microphone is plugged into the correct jack on the sound card. You can check the status of your microphone by making a simple recording using Windows Sound Recorder. In Windows 98, click the Start button, Programs, Accessories, Entertainment, and Sound Recorder. In the Sound Recorder window, click the red Record button and make a sample recording.

If you can make simple recordings using Sound Recorder and you're using other audio software to try and make recordings, the other software may be malfunctioning.

**Problem:** When using telephony software, you are having problems with two-way communications.

**Solution:** Your sound card probably doesn't support full-duplex transmission. (In full-duplex transmission, data can be sent and received simultaneously, similar to a normal telephone call. In half-duplex transmission, data can be sent only one way at a time, similar to a walkie-talkie.)

While drivers for new sound cards nearly always offer full-duplex transmission capabilities, older sound card drivers may only have half-duplex capabilities. Try downloading an updated driver as described earlier.


Windows Help
Contents
Index
Search
Windows 98 Sound Troubleshooter
What type of problem are you having?
I don't hear sounds in my program.
The sound appears to play, but I do not hear anything.
I don't hear drum sounds.
The sound is distorted or scratchy.
The sound plays, but then it stops suddenly.
The sound skips or pauses in some areas.
When a sound plays, the computer restarts.
The computer stops responding when a sound plays.
I receive the error message: "MMSystem263: This is not a registered MCI device."
I receive the error message: "MIDI output error detected."
I receive the error message: "WAV sound playback error detected."
I receive the error message: "The CD Audio device is in use by another application."
I receive the error message: "No wave device that can play files in the current format is installed."
I receive the error message: "Your audio hardware cannot play files like the current file."
I receive the error message: "MMSYSTEM298: The file cannot be played on the specified MCI device."
Back

**When all else fails, try the Windows 98 Sound Troubleshooter for additional help in fixing your sound card problem.**

**If All Else Fails . . .** Finally, here are a few last-ditch tips for fixing sound card problems.

- Try using the Win98 Sound Troubleshooter built into Win98 for some step-by-step instruction on fixing problems. Click the Start button and then Help. Next, click the Index tab, type **sound troubleshooter** in the Keyword text box, and press ENTER to gain access to the troubleshooter.
- If you have an older sound card, check the back of it for a volume wheel. Older models controlled volume through a wheel, and it may have been turned down..
- Make sure all of the chips on the sound card are firmly in place. LS

*by Kyle Schurman*

# Speakers

## Blast Those Sound Glitches Away

Speakers contribute little to the running, processing, or data-storing functions of a computer. In fact, your PC operates just fine without them. Yet, whether you're listening to a CD, playing a sound clip, or delving into a multimedia-packed game, a good pair of speakers can make or break your experience. If your speakers do not perform properly, perhaps one of these troubleshooting tips will help you fix the problem.

**Soundless Speakers.** Should your speakers refuse to speak, grab a pair of headphones, remove the speaker connector from the output jack on the sound card, and plug the headphones in. If the headphones work, you can assume the problem lies with either the speakers or their connection. Blame the sound card or some other system configuration if the headphones fail to produce any sound.

For another sound card/speaker diagnostic test, remove the speaker cable connector from the sound card, turn the speaker to maximum volume, and then touch the tip of the plug. If the speakers emit a hum or buzz, you know that they work.

Make sure that the speakers are plugged into the appropriate sound card jack. If you try plugging them into the microphone, MIDI (Musical Instrument Digital Interface) device, or joystick jacks, they won't work.

Power is also a source to check. Speakers that require AC or battery power probably won't work if they're not plugged in or supplied with batteries. The telltale light on the front of one of your speakers indicates that they use electricity. Many electrically powered speakers also sport a small volume control knob or slider.

Oddly, though, some electric speakers actually work better *without* power. If nothing else appears to be wrong with your speakers, try unplugging them and turning off the power switch. Without power, some speakers work like headphones. The only drawback is that you no longer have use of the volume control knob or slider; you must use Windows' volume controls.

Intermediary devices may also cause speaker problems. If you use a y-splitter to connect both your speakers and another device to the same jack on the sound card, interference from the other device can obliterate the sound signals. Try unplugging the secondary device to see if that solves your soundless speaker struggles.

**Partial Performance.** If one speaker works and the other one doesn't, try checking your balance settings. It could be that the audio balance has been mistakenly shifted all the way to one side or the other. Double-click

## Dealing With Headphones

Generally, a decent set of headphones greatly improves your sound quality because the sound goes directly into your ears rather than encountering interference from any number of outside sources. You can plug headphones into either the output jack on the sound card or, perhaps, into a jack on one of your speakers. Plus, many CD-ROM drives also have a headphone jack that sends CD output to the headphones.

When it comes to troubleshooting, headphones behave much like speakers, so many of the same tips apply. If you can't hear anything through your headphones, make sure they're plugged into the appropriate jack. Next, verify that the connector is plugged in all the way. After eliminating the possibility of a faulty connection, check the volume levels by double-clicking the Volume icon on the Taskbar. Within the Volume Control window, make sure that Mute is not checked under either Volume Control or CD Audio (if you're plugged into the CD-ROM drive), and use the sliders to raise the volume to a moderately high level. Your headphones may have a built-in volume control, and if they do, be sure it's turned up.

If you still can't hear anything, try plugging the headphones into your stereo system to determine whether the problem is with the headphones themselves. You might also inspect the cord for wear or damage. Usually wear shows itself at the ends of the cable by the connectors. If you find damage to the cord, repair or replace it, then try again.

You can remedy headphones that play too softly by checking the volume levels or jack connector as described above. If you hear sound through only one earpiece, open the Volume Control window and make sure that the Balance sliders all sit in a balanced position (preferably, in the middle).

You may experience distortion if you set the volume levels too high, so don't ever max out the volume controls. Besides, you'll risk damaging your eardrums by doing this.

the Volume icon on the Taskbar. Within the Volume Control window, make sure that the various Balance sliders are properly centered (especially the one in the Volume Control section).

Verify that the speaker cable is plugged tightly into the jack on the sound card as well as the jacks on the speakers (if the cable is removable from the speakers). If the connectors aren't plugged in completely or if they're plugged into the wrong jacks, one or both speakers may not produce sound. Make sure the silent speaker is receiving electricity (if needed). It may contain a bad battery, or it may not be getting power in some other way.

■ **Interference.** One common form of interference is RF (radio frequency), especially with amplified speakers. That's because the cables running from the speakers to the sound card tend to pick up radio interference. Solve or minimize the interference issue by using shorter cables or coiling and binding longer cables to limit the amount of loose wire.

Also, consider the fact that your system can receive interference from your monitor. Usually, the cheap or unshielded speakers (such as stereo speakers) interfere with the monitor, but it's also possible for monitors to interfere with speakers. Reposition your speakers or move them away from the monitor in an attempt to reduce the problem. If that doesn't help, check your local electronics store for items such as ferrite beads or RF chokers.

■ **Annoying Sounds.** Unfortunately, annoying hums, snaps, crackles, and pops often plague computer speakers. If your speakers emit irritating hums or whines, try reducing the volume by clicking the Volume icon on the Taskbar and moving the slider down.

Reducing the volume also remedies crackling or static noise. Additionally, it never hurts to verify that you have the right connectors plugged into the right jacks on the sound card and on the speakers themselves. Make sure that amplified speakers are plugged into the Line Out jack instead of the normal output jack. If your speakers only crackle when you move the Volume knob or slider, try turning the speakers off and then rapidly moving the knob or slider. Dust can easily lodge itself such that moving the knob or slider past the dust deposit causes crackling. Rapid movement dislodges the dust and returns the speakers to normal operation.

If your speakers emit an obnoxious pop when you turn on your computer, try reducing the volume. You might also turn the speakers off before shutting down the system, and then turn them back on after powering up.

Even if you can't complain about annoying sounds, it's possible that you just don't like the sound quality of your speakers. Obviously, you can't expect a cheap pair of speakers to sing like a quality set, but before you give up and go shopping, check one last setting in Windows. Open the Multimedia Properties dialog box to verify that your system settings match your speaker configuration. From Start, select Settings, Control Panel, and then double-click Multimedia. Under the Audio tab, click the Advanced Properties button below Playback. On the Speakers tab of the next window, use the drop-down menu to find and select your particular configuration. Matching settings and speaker configurations can produce better sound.

Should these suggestions fail to solve your sound glitches, consult the manufacturer for more information. LS

*by Hannah Henry*

## Low Audio

Perhaps your speakers emit sound, but not quite the volume of sound you had hoped for. If your speakers adamantly refuse to speak up, try the following troubleshooting tips.

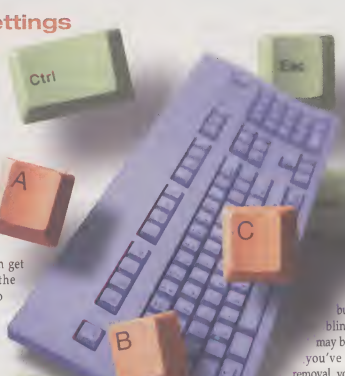
**1. Turn up the volume.** Although you've probably already thought of it, double-check your volume settings to make sure the speakers' or Windows' volume controls aren't muted or drastically lowered. If your speakers have a volume knob, make sure it's turned up moderately high. Also, check the volume setting within Windows. Click the speaker icon on the Taskbar, and use the slider to raise the volume at least half to two-thirds of the way up.

**2. Check the connectors.** If you manually plugged the speaker cables into the backs of the speakers, make sure that the connectors are secure. Next, follow the cable to where it plugs into the sound card at the back of your computer. Again, this connector must be inserted tightly into the output jack.

**3. Find your headphones.** Did you unplug your headphones after last using them with your computer? If your headphones are still plugged in, your speakers won't make sound. What you hear may, in fact, be low or muffled sound coming through the pair of headphones sitting on the desk. If your headphones are plugged in to your sound card, unplug the connector and replace it with the speaker connector. Or, if your headphones plug in to a jack on your speakers, unplug them.

# Keyboards

## Cleanliness & Settings Are Key Factors




Most people take their keyboard for granted. It takes a back seat to other "more important" components, such as the hard drive or processor, which cause catastrophic failure when broken. It's only when your keyboard unexpectedly malfunctions that you realize its worth. With a little creativity, you can get around your computer using only the keyboard and no mouse, but there's no way you can write a document, type a Web address, or compose an e-mail message using only your mouse and no keyboard.

By nature, keyboards are hardy creatures, which if treated gently and kept clean, will live long and productive lives. Yet, in the event of a keyboard emergency, arm yourself with the following troubleshooting tips as you attempt to resuscitate this vitally important input device.

**Malfunctioning Keyboards.** If your keyboard fails to work at all, begin the troubleshooting process by powering down the computer. Locate the cable that connects the keyboard to the back of your computer, and inspect its general condition. Wear is most likely to occur on the ends of the cable, especially on cables that have been bent awkwardly, stretched, or frayed.

Next, verify that the connectors on both ends of the cable are in good shape (no bent prongs) and plugged in firmly. If either cable or connectors appear damaged, you may need a replacement. Symptoms of a connection problem include error messages telling you that your keyboard is not attached or has failed. If possible, swap in an alternate keyboard to help you determine whether the problem is with the keyboard itself or with the system.

You might also check to see if your keyboard has a small switch on the bottom. This switch enables it to work with different types of computers. If you inadvertently bumped the switch, the keyboard may no longer be accessible to your particular computer.

Another factor to consider is: Did you hold down a key while booting the computer? If you did, this mistake may be the cause of your keyboard errors. Software conflicts, though rare, can occur. Some applications have issues with certain keyboards. If you notice that your keyboard only misbehaves when running a particular program, contact the keyboard or software manufacturer for advice. The manufacturer's Web site is sometimes a good starting point.

If your wireless or infrared keyboard fails to work, make sure that it's sitting close enough to the system unit. You also might try replacing the batteries.

On the other hand, if a keyboard has been dropped or otherwise treated roughly, its internal printed circuit boards may suffer damage. If you think this could be the cause of your keyboard catastrophe, contact the manufacturer for more information. Do not try to take the keyboard apart and fix the problem yourself. Leave that task to the professionals, and if they can't solve the problem, then it's probably time for a new keyboard.

**Loose Keys.** Some keyboards naturally have looser keys than others, but if you find one or two keys wobbling more than normal, something may be wrong underneath the keycap. If you've previously attempted keycap removal, you may not have replaced the keycap properly. The keycap must noticeably snap into place and will remain loose if it's not adequately latched into the mechanism below. Try removing the key altogether, and then carefully replacing it (see the "Key Removal" sidebar for details).

Rough keycap removal or careless handling of the keyboard may cause breakage of the delicate parts holding the keycaps in place. Perhaps the latching mechanism is broken, and a new keyboard is in order.

**Sticking Keys.** Sometimes keys stick when you push them. If you notice a sticking key, power down the computer and unplug the keyboard. Next, press and gently wiggle the offending key. This movement may loosen whatever was hampering it.

Another possibility is that someone accidentally dropped the keyboard, and the impact of the fall knocked a keycap out of alignment. Try removing the sticking key's keycap and then properly replacing it (see the "Key Removal" sidebar for instructions).

Sticking keys often result from a dirty keyboard. If your keyboard hygiene leaves something to be desired, the following information about keyboard cleaning may help you solve your sticky key dilemma.

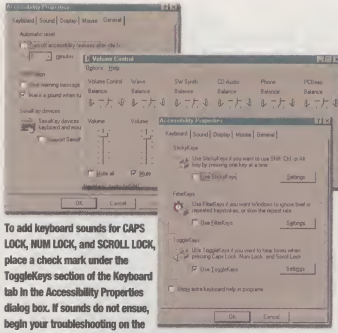
■ **Dirty Keys.** Keep all food and drinks away from your computer. Smoking while at your computer isn't a good idea either. Hot particles falling onto the keyboard can mar the surface or burn the contacts beneath the keycaps. No matter how careful you may be, accidents do happen. Consider purchasing a keyboard cover or skin. This simple accessory costs less than $10 at your local computer retail store. It's a good investment for anyone, especially if your keyboard lives in a dirty environment, such as a mechanic's shop or manufacturing plant.

Spills are a keyboard's worst nightmare. In the event of a water spill, immediately shut down the computer and disconnect the keyboard. Flip the keyboard over to drain out as much of the water as possible. Use a towel to sop up the remaining moisture, and then let the keyboard air dry for at least one day. (If you need to remove any keycaps to wipe water from beneath the keys, be sure to read the "Key Removal" sidebar.)

Water spills are inconvenient, but soft drinks, juices, or coffee sloshed over the keyboard can be disastrous. These drinks contain sugars, acids, and dyes that can corrode the keyboard's insides. Besides the danger of corrosion, the inevitable dust found lurking between the keys turns to glue when mixed with sticky liquid.

Immediately turn off the computer and disconnect the keyboard. As with a water spill, drain out as much of the liquid as you can. Rinse the affected area with distilled water to dilute the sticky residue. You may need to remove the keycaps for deeper cleaning and drying (again, see the "Key Removal" sidebar for instructions). Exceptionally bad spills may even merit the disassembling of the keyboard housing by removing the screws in the back. If you disassemble your keyboard, do so carefully. Should you feel any doubts or run into any questions about the procedure, contact the keyboard's manufacturer for more information. Once the keyboard is cleaned and blotted dry, allow it to air dry for at least one day.

Besides spills and general dust and debris, dirty fingers and unwashed hands can leave greasy smudges or fingerprints all over the keyboard. While fingerprints may not adversely affect the operation of the keyboard, they are unsightly. Stop by your local computer store to pick up supplies, such as surface-cleaning solutions, antistatic wipes, absorbent cloths, and even entire keyboard cleaner kits. Denatured alcohol (99% isopropyl alcohol) or general-purpose household cleaners may work just as well. Other common household items such as cotton swabs or foam make-up applicators can help you clean those hard-to-reach places.




**To add keyboard sounds for CAPS LOCK, NUM LOCK, and SCROLL LOCK, place a check mark under the ToggleKeys section of the Keyboard tab in the Accessibility Properties dialog box. If sounds do not ensue, begin your troubleshooting on the General tab or in the Volume Control window.**

## Dust & Debris

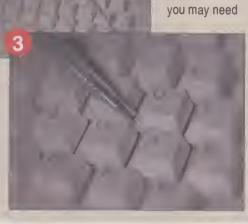
Grime, particles, and dust buildup over time can cause keys to stick or develop other defects. Regular cleaning alleviates the risk of dirt-related damage. Before launching into the following keyboard cleaning tasks, be sure to shut down your computer and unplug the keyboard.

1. Turn the keyboard upside down and gently shake it or tap on the backside. This motion may dislodge some of the offending debris.

2. A can of compressed air or a keyboard vacuum (available at your local computer accessory store) also work wonders for general dirt removal. However, if you use compressed air, make sure that you are not simply blowing the dust into an even more unreachable corner.

3. If shaking, vacuuming, or blowing fail to deter the dust, you may need to remove some of the keycaps. (See the "Key Removal" sidebar for details.)

If you accidentally drop a metal object, such as a staple or a paper clip, in between the keys, stop immediately to retrieve them. Shut down and unplug the keyboard, remove the nearest keycaps, and then pull out the offending item with non-magnetic tweezers or needle-nosed pliers. Items like these can jam keys, cause them to short out, or wreak even more havoc if they fall into the circuitry.



■ **No Key Sounds.** Through Windows' Accessibility Options, you can tell the computer to make a high sound when you activate CAPS LOCK, NUM LOCK, or SCROLL LOCK, and make a low sound when you turn them off. These settings, which are found on the Keyboard tab of the Accessibility Properties dialog box (choose Start, Settings, Control Panel, and then Accessibility Options), may be helpful to someone with physical disabilities.

If you've set your computer to beep in response to the CAPS LOCK, NUM LOCK, or SCROLL LOCK keys but don't hear any noise, there are a few things to check. First, make sure the volume is up. Double-click the Volume icon on the Taskbar to open the Volume Controls window. Here, check the levels under the Volume Control (and PC Beeps, if you have this) section. If either of these settings have been lowered or muted, you will not hear the keyboard sounds.

If this isn't the problem, reopen the Accessibility Properties dialog box, and select the General tab. If Automatic Reset is selected, your computer will turn off the Accessibility settings after a certain period of idle time.

## Key Removal

Sometimes all the vacuuming, blowing, or wiping in the world fails to dislodge a piece of debris or remedy an unruly sticky key. Your keyboard forces you to get serious about cleanliness by requiring you to remove one or more keycaps. At first, you may fear harming the keyboard, but as long as you move slowly and carefully, you'll be fine. Begin by shutting down your computer and unplugging the keyboard.

Arm yourself with a butter knife from the kitchen (any thin, flat, blunt object will do), or use a special key-pulling tool (available at your local computer supply store). Owners of key-pulling tools simply follow the instructions for usirng the tool. Butter knife users gently slide the knife beneath the edge of the key and slowly pry upwards. Sometimes a rocking motion helps, but generally, the keycaps should pop off without too much prying or pulling. The only key to give particular caution to is the Spacebar. A small wire running through the Spacebar holds it level and makes it difficult to remove and reinstall properly.

If you must remove several keycaps, you run the risk of forgetting which ones went where on the keyboard. Devise a way to keep track of them so that you don't accidentally reorder your keyboard without your computer knowing it. Often, something as simple as an empty ice cube tray can help you keep your loose keycaps in proper sequence.

Whatever is beneath the keycap may vary, depending upon the type of keyboard or the manufacturer, but as a rule, give that tiny mechanism—whatever kind it is—healthy respect. With the offending keycaps removed, go about your cleaning with a soft-bristled brush to dislodge the debris, and then use a can of compressed air or a keyboard vacuum to finish it off. Some especially belligerent keys may require more than the basic dusting and vacuuming procedure. This is particularly likely if something sticky has been spilled on the keyboard, causing certain keys to malfunction. After a thorough cleaning with the keycaps removed, squirt an electronics-grade contact cleaner on the offending key switches. Carefully lift the small plastic or rubber boot that may cover the keyboard contact under the keycap. Replace the plastic or rubber boot and depress the key several times to work the cleaner into the mechanism.

After you finish cleaning, wait for the area to dry, and then begin replacing the keycaps. Lay the keycap squarely over its key mechanism and press down firmly. You should hear it snap into place. Once all the keycaps are reattached to the keyboard, plug the keyboard back into the computer and reboot. □

■ **Too Fast, Too Slow.** When you sit down at a new keyboard or return to your old keyboard after another person has used it, you may find that the character repeat rate has been changed. Set it according to your preference by choosing Settings and Control Panel from the Start menu. Double-click Keyboard to open the Keyboard Properties dialog box, and then look at the Character Repeat section on the Speed tab.

Use the sliders to adjust the amount of time that elapses before a character repeats itself when you hold down a key. You can also speed or slow the repeat rate itself. Try typing in the blank field of the dialog box to test your chosen speeds before clicking Apply and OK.

■ **The Comfort Zone.** Your keyboard may operate properly, but if you suffer from any discomfort while working at your computer, consider the fact that your seemingly innocent keyboard may be to blame. Comfort is key to users who spend several hours per day at their computers; therefore, keyboard troubleshooting may extend to the diagnosing of various aches and pains.

Carpal Tunnel Syndrome is a repetitive strain injury or cumulative-trauma disorder that affects the wrists. To deter this ailment, make sure that the keys on your keyboard are neither mushy nor wobbly. Likewise, overly stiff keys require too much force when typing. Concave keycaps help prevent your fingers from inadvertently slipping off their perch on the keyboard. Most importantly, wrist rests (available at any computer store) provide support for your wrists, keeping them at the proper angle, and thereby reducing strain on the joint.

Many avid computer users or desk-job holders develop an annoying stiffness in the neck and shoulder area. You should not have to lean forward or hunch over to reach your keyboard. Your arms should come straight down from your shoulders, and your wrists should be aligned with your forearms. Adjust the height and positioning of your chair to achieve this posture, and if possible, consider purchasing a moveable keyboard tray for even more flexibility. You must also make sure that your chair supports the natural curve of your lower back while keeping your back upright against the chair to support your upper body's weight. Proper posture is key to avoiding neck strain.

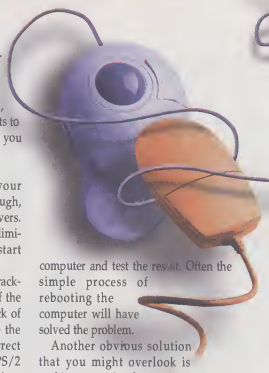
Generally, you'll find that basic keyboard maintenance and repair is relatively simple. Though major keyboard failures are rare, if one should occur, take heart in the fact that it takes less than $50 to purchase a brand new keyboard. LS

*by Hannah Henry*

# Mice & Trackballs

## Pointing Out The Best Solutions

Most of the software you use will let you select options with your mouse, and some of them, such as graphics applications, simply won't function without the mouse. So, when your mouse or trackball fails or starts to malfunction, it affects almost everything you do, even shutting down your computer.



■ **Quick Fixes.** Before you yank your mouse out of the back of your PC, though, you should try a few simple problem solvers. To begin, don't overlook the obvious; eliminate the simple solutions before you start looking for complex ones.

First, check the cord connecting your trackball or mouse to your computer. Turn off the computer, locate the connector at the back of the computer, and make sure you have the mouse connector plugged into the correct socket, particularly if you're using a PS/2 mouse that you may have easily plugged into the keyboard socket by mistake. If it is in the right socket, verify the connector is securely in the socket. In addition, check to make sure the cable isn't kinked or damaged in any way and that the pins in the connector aren't bent or broken. If you have a damaged cable or bent or broken connector pins, replace the mouse (most of the time, it simply isn't cost-effective to repair them). If all seems OK, restart your computer and test the result. Often the simple process of rebooting the computer will have solved the problem.

Another obvious solution that you might overlook is making sure the device is getting enough power. If your device runs on batteries, check that the batteries are fully charged and installed the correct way. If you plug your device into the wall, make sure you are using a functioning socket and that the power supply is on (especially if it is in a surge protector).

One other quick solution is to clean your mouse (see sidebar) and check your mouse pad to ensure it is clean and not warped.

■ **Mouse Madness.** If one of the obvious solutions doesn't cure your mouse or trackball woes, then one of the following problem and answer combinations may help.

**Dead mouse.** If your mouse doesn't work and you need to exit Windows, press the Windows key on your keyboard. Then, use your Up arrow key to choose Shut Down, press ENTER, use the arrow keys to choose Shut Down, and press ENTER again. If you don't have a Windows keyboard, you can mimic pressing the Start button if you press CTRL-ESC.

**Too many devices.** It's not unusual to encounter problems when you attach an external mouse to a notebook computer that already has a built-in pointing device such as a trackball or touch pad. You may encounter an error message, the mouse may simply not respond to your touch, or it may function erratically. The likely cause is a conflict between the internal pointing device and the external mouse. You can often solve this problem by temporarily disabling the internal pointing device—you'll find instructions for this in the computer's manual. Another alternative is to use a different type of connection method. For example, if your mouse comes with a variety of connectors, such as a PS/2 connector and a serial one, try the other type of connector and see if this works better.

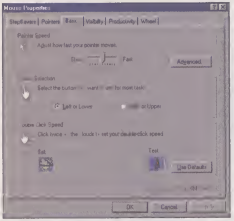
**Conflicts.** One problem you may encounter is with conflicts that may arise when you have a mouse and a modem both plugged into COM ports. To solve this problem, remove one of the devices (the modem or the mouse) and try reinstalling it again. If the problem persists, consider altering the type of connection you use for your mouse or modem, for example, if the mouse will operate as a PS/2 or COM mouse, try the PS/2 connection instead and leave the COM ports for the modem.

**Sudden problems.** In most cases, if your mouse has functioned correctly for some time and suddenly fails, ask yourself what hardware or software you recently installed. It may be the new piece of hardware is causing conflicts with the mouse or a rogue program has overwritten your mouse driver. If you've recently installed new hardware, uninstall the hardware and see if the problem persists. If it doesn't, contact the hardware manufacturer or your mouse manufacturer and see if they have any advice to overcome the conflict. If it

## Wireless Wipeouts

When you have multiple cordless devices in close proximity to each other, you can get interference between them. Typically, moving a mouse on one computer may move the cursor on the screen of the computer, next to it. If this happens, move the receivers closer to the mice they control and keep the receivers of both computers as far away from each other as possible. In addition, when you are installing wireless devices, do them one after the other and leave a period of time (say, half an hour or more) between installing each of them. Many cordless devices, when installed, take some time to look for devices around them. If you install another device nearby while the first device is looking around, you can end up synchronizing the second device to the first receiver.

Other cordless devices can also cause interference, so if you have, say a cordless mouse and a cordless printer, move the two away from each other so they won't interfere. In addition, be aware that devices such as TV remotes use infrared technology and can interfere with your mouse. □




**The Mouse control panel lets you fine-tune how your mouse behaves. If your mouse moves too fast or responds too slowly, you can adjust the settings using this control panel.**

is possible that a recently installed application has corrupted your mouse driver, reinstall it using the software and instructions that came with your mouse.

As a general precaution, you should periodically check for a new driver for your mouse. Most reputable mouse and trackball manufacturers supply new drivers from time to time to overcome problems that users have encountered or to support new operating systems. Visit the Web site of your mouse manufacturer and see if a new driver is available.

■ **Physical Settings.** You often can solve what appears to be a physical problem with your mouse by adjusting its setup. For example, a mouse that moves too fast or slow or that doesn't appear to respond to a double-click may, in fact, simply be wrongly adjusted for the computer or the user. To adjust it, choose the Start button, Settings, and then Control Panel. Double-click the Mouse icon. The dialog box that appears has a number of tabs you can select and use to test your mouse and to adjust its speed across the screen, the rate of double-clicking, and other options. (*NOTE: The tabs that appear depend on the type of mouse you have and its software.*)

■ **Infrared Devices.** If you're using an infrared mouse or trackball, it can pose its own set of problems that are different from their wired counterparts.

**Out of range.** If you find the mouse keeps going out of range, move the mouse closer to the receiver and see if that solves the problem. You also need to ensure that there is nothing between the mouse and the receiver that could be causing interference. In particular, place the receiver away from electrical devices because these often cause interference that, in turn, causes infrared devices to malfunction. Electrical devices that may cause problems include your monitor, speakers, printer, and scanner.

**Interference.** You also may encounter interference when you use your infrared mouse or trackball in a situation where there are metal surfaces close by. For example, if you are having problems and the frame of your desk is metal, try moving your mouse. If this doesn't work, you may need to use a different type of mouse or replace your desk. You also might experience interference problems if you are not using the mouse or trackball on a steady surface.

**Reception troubles.** Sometimes you will encounter a situation where the receiver and the mouse don't properly line up, causing reception problems. Move the receiver to different places on the desktop to see if you get a better reception. Place the receiver on its side or at a different angle. You can even elevate it a half-inch or so to improve the situation.

**More problems.** If you still encounter problems, clean the infrared windows and consider shading the devices or turn off bright lights as light is also a possible source of interference.

■ **Simple Solutions.** Most of the problems you will encounter with your mouse or trackball will be simple to fix. The key is keeping your mouse clean and your software updated. If you have an infrared device, you also need to properly place it on your desktop. LS

*by Helen Bradley*

## Keep It Clean

Most mice that jump around the screen or stall in their tracks simply need a good cleaning. Here is how to clean your mouse or trackball so it runs smoothly.

1 Turn off your computer and unplug your mouse. Before you unplug your mouse or trackball, turn off your computer. Then, turn your mouse over and remove the retaining ring that holds the ball by turning it in the direction (probably left) of the arrows marked on it (or in the direction marked Open). Flip the mouse and ball over and the ball will drop into your hand. For a trackball, it will usually have a retaining ring and an ejection tab so, first remove the retaining ring and then push the ejection tab to eject the trackball. If you're unsure how to do this, follow the steps in the manual that came with your trackball.

2 Rub the ball with a lint-free cloth to clean it. Use compressed air on the inside of the mouse or trackball to remove any loose dust or lint. Then, use a lint-free swab to clean the rollers. You also should clean the bottom of the mouse with the cloth to remove any dirt build up on it. If the dirt won't come off with a lint-free rag, try using a paperclip or a tooth pick. Avoid using alcohol unless the manufacturer's instructions specifically suggest it.

3 Replace the clean ball inside the mouse or trackball. Place the retaining ring in position and turn in the opposite direction to the arrows marked on the ring (or in the direction marked Close). Plug the mouse back in and start your computer to test the result. ■

# Scanners

## Fix Scanning Problems With These Tips

The ads make it all seem so easy: Buy an inexpensive, user-friendly scanner for your computer, and before you know it, you'll be e-mailing photos of your kids to all your friends and relatives, and maybe even putting up your own picture-filled Web site.

However, what the ads don't show is that scanners can be one of the most problem-plagued peripheral devices you will add to your computer. Once you have it installed properly, you will most likely have a lot of fun with it, but don't be surprised if you encounter a few headaches along the way.

■ **Scanner Help.** To help you with your scanning woes, we've prepared a guide to several of the common scanner problems you might encounter.

**Problem:** Your scanner is making a clicking noise.

**Solution:** Your new scanner is making a loud clicking noise and it doesn't work. Some scanners come "locked" to protect the internal parts from moving during shipping. They must be unlocked before using. Examine your scanner for something that looks like a switch, possibly with the picture of a lock next to it, located near the bottom or back of your machine. On a UMAX Astra 600S scanner, for example, the locking switch is under the lid near the hinge, and it is only visible if you lift the lid off the scanner completely.

If you can't find the lock, check your manual, which may describe its location.

**Problem:** Unrecognizable scanner.

**Solution:** Your computer doesn't recognize your scanner even though you've followed the installation steps. This is one of the most common scanner problems people encounter. The good news is that the problem is most often a configuration error, rather than a physical defect in the scanner or cables, and can usually be fixed.

First, make sure the scanner is plugged in and turned on (your scanner needs to be on before your computer boots up or the computer might not recognize it when it scans for peripheral devices while loading). Also, wiggle the cables to make sure they are firmly connected; you can try reversing them, which sometimes helps.

If you are still having problems, go to the Control Panel (located in the Start menu under Settings). Double-click the System icon, which will bring up your System Properties control panel. Choose the Device Manager tab, which will show you all the devices that are hooked to your PC including your mouse, printer, and scanner. If there is a problem with any device, such as a hardware conflict, a large yellow exclamation point will appear at the listing for that device. Check to see if your scanner is listed; if it is, look for a yellow exclamation point.

If there is an exclamation point, double-click the listing for your scanner. Let the Device Manager lead you through the next few steps, showing you what it considers wrong and suggesting a way to fix it. You may need to reinstall your scanner driver at this point, so have your scanner software CD-ROM ready.

If you don't see your scanner listed in the Device Manager, go to the Scanners and Cameras control panel (if you have Windows 98 or Windows Me), or to the Add/Remove New Hardware control panel, and follow the steps listed to reinstall your scanner drivers.

If this doesn't work, uninstall the scanner software using the Add/Remove Hardware control panel. Next, reinstall again, making sure to follow the exact sequence listed in your scanner's manual.

If you have a USB (Universal Serial Bus) scanner that is plugged into a USB hub, or a parallel-port scanner that is "piggy-backed" to a printer, try plugging these devices directly into your computer and see if this makes a difference. Make sure to push the USB plug all the way in (sometimes this can be tricky). Also, you may need to turn on the appropriate ports if this is the first time you've used a USB device. Review your system's BIOS (Basic Input/Output System) setting to see if the USB ports are enabled. Do this by pressing DELETE during the Startup sequence, which opens a window showing your settings.

**Problem:** Scanner can't be found.

**Solution:** Your scanner was working just fine, until now. You're getting an error message saying it can't be found and it won't work at all. This is another common problem. Sometimes scanner software or connections become corrupted or disrupted. Try tightening cables and making sure power is turned on. If this doesn't work, you may need to uninstall everything related to your scanner and reinstall from scratch. You also may need to go to your scanner manufacturer's Web site and download new drivers or patches (software fixes).

**Problem:** Scanning takes forever.

**Solution:** If you notice your scanner is taking a long time to scan pictures, then there are several things you should check. First, your scanner software should let you set your image quality or resolution. Usually, this is measured in dpi (dots per inch), with a typical image resolution being about 300dpi. If you've bumped this resolution quality up to the highest your

scanner allows, such as 4,800dpi, your scan will take a very long time to complete and you'll wind up with an enormous file when you are done. Since even photo printing doesn't require a dpi above 600, and can often work just as well with 300dpi, you should reset your dpi to the lower numbers. If you plan only to send your scan onto the Internet, either via e-mail or by putting it up on a Web page, then you can scan at 72 to 100dpi; computer monitors can't interpret anything higher than this, and you will be creating huge files that computer users will have to scroll all over their monitors to view.

Also make sure you are "pre-cropping" images using your scanner's Preview mode, prior to scanning. If you aren't doing this, your scanner is wasting time and energy scanning the white background around the item you want to scan.

A third possible reason for slow scans is that you don't have enough system resources available for the scanner. If your computer doesn't have a lot of RAM, you won't have much available to the scanner and it will work more slowly. Check your system resources to see how much is left over for the scanner by going to the System control panel. You should have 80% to 90% of your system resources available for scanning; if you are

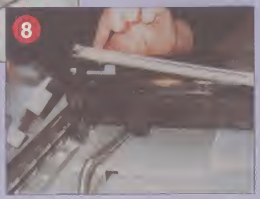
## Replacing Your Scanner's Lightbulb

If your scans seem to be darker around the edges, particularly when you are scanning things that are as wide as your scan bed, you might need to replace your scanner's lightbulb. While newer scanners use cold cathode lights that don't usually need replacing, older machines may need bulbs changed. Symptoms of this are a darkening around the edges of the scan bed and an overall darkening of the scans.

This isn't the only reason for darkened edges. Sometimes a burned-out lightbulb could be the result of a defect on the scanner's mainboard, so simply replacing the bulb might not fix this symptom. However, given the price of scanners today (with good scanners available for $100 or sometimes less), it rarely makes sense to take an old scanner in for service. If you can find a lightbulb for a few dollars and want to try replacing it to see if it cures your scanner's ailment, here are some easy tips.

Keep in mind that some scanners are built so that it's fairly easy to get to and replace the bulb; others require servicing by a professional. You also may run into difficulty finding replacement bulbs. Your best bet is to contact your scanner manufacturer or the service department where you bought your scanner; you could also try lighting contractors or Web sites such as Lamp Express USA's Web site at http://www.lexusa.com/lexusa/scanbulon.html.

Due to the wide variety of scanners on the market, the following instructions for replacing a bulb on an Astra UMAX 600S may not apply to your machine. However, they can serve as a general guide.



**1.** Turn off your scanner and unplug it.

**2.** Lift the lid on the scanner and remove it from the rest of the machine (it simply slides off, with no unscrewing required).

**3.** Unscrew two large screws located at the end closest to the lid hinge.

**4.** Remove the top portion of the scanner, which includes the glass. Set it aside.

**5.** Remove the plastic locking piece that the scanner roller is sitting in.

**6.** You will see a silver metal casing covering one end of the inside of the scanner. A single screw is visible. Unscrew it.

**7.** On the other side of the silver casing, you will see two small tabs. Gently lift these and pull the silver casing off.

**8.** The lightbulb looks like a long white pencil or tube. Lift it out of the groove it is resting in and unplug the plastic plug that it's attached to.

**9.** Put the new lightbulb in its place and plug it in.

**10.** Put the silver casing back on and screw it down.

**11.** Put the locking piece back in place.

**12.** Put the top of the scanner back on and screw it in.

**13.** Finally, slide the lid back into its groove. And you are ready to scan.

down to 40% or 50%, it's probably time to add more RAM.

Finally, make sure you aren't running other programs while scanning. Sometimes your computer runs programs without your having launched them; you may not even realize they are running. Press CTRL-ALT-DEL to see which programs are active and cancel those that aren't related to scanning.

If your scanner slowdown has only recently occurred, another possible cause is that your scanner's glass has become dirty or dusty, causing the scanner to pause to correct what it is seeing. Get a soft, clean cloth, dampen it with water and mild cleaner (don't spray the scanner directly, but put the liquid on the cloth instead), and wipe the glass clean. Don't close the lid right away as this could trap moisture. Waiting a few minutes and try scanning again.

**Problem:** Missing the picture.

**Solution:** Your scanner scans the entire scanner area, including the white around the pictures. How can you get it to scan just the pictures? Most scanners use software that has a Preview mode, which lets you see what it is you intend to scan. In the Preview mode you can crop your picture so only what you want scanned is actually scanned. The crop symbol in many menus looks something like a small box with offset lines. Or, you can locate Crop under the File or Edit menus.

**Problem:** After upgrading to WinMe, your scanner no longer works.

**Solution:** You most likely need a new driver for your scanner that is compatible with WinMe. Visit your scanner manufacturer's Web site or call to find out whether new, WinMe-compatible drivers are available.

**Problem:** Computer freezes up.

**Solution:** While using your scanner, your computer freezes up and crashes. There are several reasons this could be happening. First, you may not have enough memory available for the scanner to do its business and still leave room for Windows to run, especially if you have a lot of other programs or tasks running at the same time. To remedy this, close all other programs when running your scanner, consider installing more RAM, scan at lower resolutions, and try keeping only one image open at a time.

**Problem:** Editing scanned text.

**Solution:** You've just scanned a letter into your computer, but you can't change any of the words or add anything to it. What's wrong? If you want to edit text that you've scanned, you'll need to scan it again with an OCR (Optical Character Recognition) program such as ScanSoft's OmniPage and TextBridge (http://www.scansoft.com) or FineReader by ABBYY (http://www.abbyy.com). Otherwise, if you scan a document without using OCR, your scan is considered a graphic file and can only be viewed with a graphic-editing program.

**Problem:** Photoshop dilemma.

**Solution:** You want to use Photoshop to edit your pictures, but you are having trouble getting your scanner to put them into Photoshop. You will need to make sure that whatever image-editing application you use has a copy of the TWAIN (Technology Without An Interesting Name) driver for your scanner. If you install an image-editing application such as Photoshop after installing your scanner, the application won't know how to work with your scanner without some help on your part. You will need to locate your scanner's program files in Windows Explorer, find the TWAIN driver within the program file (probably in the Plug-ins folder), and make a copy of it. Next, place the copy into the Plug-ins folder inside your image-editing application folder. After restarting, your application should be able to recognize your scanner. You can then use the File/Acquire command to bring up your scanning software, causing your scan to appear in your favorite image-editing program.

**Problem:** Poor scanning results.

**Solution:** Your scans don't look right, maybe the colors don't match the picture, or they are blurry or grainy with lines through them. What can you do? Make sure you're using the most recent drivers for your machine and operating system, that you have enough memory to run your scanner properly, and that your scanner glass is clean. Cables connecting your scanner and computer should be no more than 10 feet in length.

If the problem persists, consider trying another software program to scan images for you, such as VueScan (http://www.hamrick.com/vsm.html). Another source for scanner software, including freeware, is http://www.scanhelp.com. LS

*by Lorna Collier*

## Scanner Resources

Here are a list of major scanner manufacturers and their scanning support areas, as well as other good resources for scanner information.

**Scanner Manufacturers**

**Agfa Group**
**http://www.agfahome.com**

**Epson America**
**http://support.epson.com/troubleshooting.html**

**Hewlett-Packard**
**http://www.hp.com/go/ScanJet** (for basic information about desktop scanners)
**http://www.hp.com/cposupport/nonjsnav/sjetscan.html** (for troubleshooting help with specific scanner models)

**Microtek**
**http://www.microtekusa.com**

**Mustek**
**http://www.mustek.com**

**Visioneer**
**http://www.visioneer.com**

**UMAX**
**http://www.umax.com/support**

**Other Resources**
**http://www.scantips.com**

This excellent site, written by Wayne Fulton, author of a book about scanning, provides a wealth of detailed information about scanning in general as well as specific troubleshooting tips. The site also includes a section specifically addressing the Microtek line of scanners, with instructions for replacing the lightbulb and cleaning the underside of the glass.

**http://www.lexusa.com/lexusa/scanbulon.html**

If you need to replace your scanner's lightbulb, you may be able to find a replacement bulb at this site. It has an Order Scanner Bulbs Online section, organized by scanner make and manufacturer.

**Newsgroups Devoted To Scanners:**
**alt.peripherals.scanners and alt.comp.peripherals.scanners**

America Online users can add these newsgroups by going to Keyword Newsgroups, choosing Expert Add, and typing these newsgroups in. To read posts, go to Keyword Newsgroups and choose Read My Newsgroups. Subscribers to other online services can access newsgroups through their browsers or by going to http://www.dejanews.com.

# Digital Cameras

## Crop Out Performance Obstacles For Picture-Perfect Results

Most of the time, digital photography is a simple matter of aim and shoot. But every once in a while, something goes wrong. For example, the flash won't work, the camera's LCD (liquid-crystal display) screen appears black, or your computer won't recognize the camera. In any case, this is not the time to panic; your photos, whether for business purposes or family memories, hang in the balance. With a little know-how and an understanding of the problems that are most likely to strike your digital camera, you can diagnose the problem and recover in time to save your snapshots.

**Problem:** The camera doesn't work.

**Solution:** This is the problem that inexperienced digital photographers fear the most. After spending umpteen dollars on a digital camera, they want to take pictures and not fiddle around with electronics. Fortunately, the most likely cause of an inoperable camera is the end-user. That's right, the person holding the camera probably did something wrong.

If your camera won't let you take pictures, first check the obvious. Does it have batteries in it? Is it turned on and set to picture-taking mode? Did you insert a formatted memory card in the camera's storage drive? These initial steps are the digital equivalent of removing the lens cap. (By the way, if your digital camera has a lens cap, make sure it isn't covering the lens.)

Next, take the time to check for a few common configuration problems. Unplug any cables that connect the camera to your PC. The camera won't let you take pictures if it thinks it's supposed to be transferring images to your computer. You also should delete images from the memory card if it's full because the camera won't let you take pictures if the storage media has no room to accommodate them.

Finally, you should replace the batteries. Low or dead batteries are the cause of many problems in digital photography, says Sally Smith Clemens, media representative for the Olympus consumer product group. "Always replace the batteries once a year, whether you need it or not," Smith Clemens says. "And make sure you use the right battery type." Most digital cameras use AA-sized alkaline, NiMH (nickel-metal hydride), nickel-cadmium, or lithium batteries.

If these steps don't resolve the problem, then it's possible the camera has a mechanical defect. Contact the camera manufacturer or seller for information about returning the camera for a replacement or refund.

**Problem:** When I push the shutter button to take a picture, the camera pauses briefly before capturing the image.

**Solution:** The shutter button on a digital camera does more than just open the shutter, as it does on a film camera. It also signals the camera to perform a series of automated functions, including focusing the lens and saving up to 3 million—or more—pixels. That slight delay you experience when you push the shutter button is the camera gearing up for the process of capturing data.

You can minimize the delay on some cameras by taking advantage of the auto-focus feature. These cameras let you focus the camera by pressing the shutter button halfway down. To take the picture after the camera focuses, press the shutter button until it clicks. This effectively reduces the delay between the time you press the shutter button and the time the camera captures the image.

**Problem:** The LCD screen is black.

**Solution:** Assuming that the LCD screen has not died—an unlikely occurrence, barring physical trauma such as a direct blow with a sharp object to the screen itself—you probably can blame this problem on one of two causes. Either the batteries don't have enough remaining juice to fuel the gas-guzzling LCD screen or the LCD's brightness control needs to be adjusted. Replace the batteries if you believe the problem is due to the former; if you believe the latter is to blame, consult the users manual for specific instructions about adjusting the brightness.

**Problem:** I can't get the memory card into the camera.

**Solution:** This common problem is probably due to one of three things: you're using the wrong type of memory card; you're trying to put the card in backward or upside-down; or there's another memory card already in the camera. To rectify this situation, first make sure the card slot is empty. If that doesn't solve your problem, refer to the users manual to ensure that you have the correct storage media and that you're inserting it correctly.

**Problem:** The flash doesn't work.

**Solution:** First check to see that the flash is turned on; refer to the users manual for specific instructions on enabling the flash. Once the

flash is enabled, give the camera a little time to recharge. The flash is a major drain on the battery, and it might take a few seconds (even in the best circumstances) for the flash to muster up the power to do its job. If you still can't use the flash, insert a new set of batteries in the camera. Low batteries may provide enough juice to open the shutter but can't support a full-fledged flash shot.

**The Olympus C-3000 Zoom ($675; http://www.olympusamerica.com) is a 3.34-megapixel camera that supports resolutions up to 2,048 x 1,536, which are necessary to print 11- x 13-inch images. Trying to print large images at lower resolutions will result in blocky prints.**

**Problem:** The memory card doesn't hold many pictures.

**Solution:** The capacity of the memory card is set to a certain size, typically between 8MB and 64MB. You can't change the capacity. You can, however, change the number of pictures that fit within that capacity. File format and resolution are the two primary factors that affect image file size. An image file that has a resolution of 1,600 x 1,200 pixels and is saved in the bulky TIFF (Tagged Image File Format) will be much larger than an image file that has a resolution of 640 x 480 pixels and is saved in the highly **compressed** (condensed to a fraction of its original size) JPEG (Joint Photographic Experts Group) format. To store more images on a memory card, set the camera to take pictures at the lowest practical resolution and save the images in JPEG format.

What if you're taking low-resolution JPEG images and still feel that the storage media is cutting you short on space? Put the storage media in your camera and format it. Formatting the storage media not only eliminates all the old image files from the card, but it also rids the card of any auxiliary files that were added to it during the download process. Formatting essentially returns the card to a pristine condition. Refer to the users manual for step-by-step instructions on formatting your storage media.

**Problem:** The computer won't recognize the camera.

**Solution:** You have a connectivity problem, one that could stem from any number of causes. A loose or improperly seated cable connection, for instance, will prevent you from accessing your data. Low or dead batteries will, too. Even something as simple as forgetting to turn on the camera will prevent you from getting the images you want. Before calling technical support, you should double-check the cable connections and put in new batteries. Make sure you turn the camera on and set it to the transfer mode.

Once you're certain that the hardware is set up properly, it's time to rule out any software issues. The software that came with your camera is responsible for getting the images from your camera to your computer. It includes a **device driver** (an application that lets a hardware component communicate with the rest of the computer system) and the **TWAIN (Technology Without An Interesting Name** ; standard that governs the way imaging hardware and software communicate) application, which let you port data between the camera and the computer. An outdated driver, faulty installation, or incorrect configuration can prevent your computer and camera from working together harmoniously.

To fix a software problem, first check with the camera manufacturer's Web site to see if an updated device driver is available. Look also for relevant product updates. These downloadable updates consist primarily of fixes and workaround solutions for device conflicts and bugs that have been discovered since the software was initially released.

Next, read the users manual. More than a few digital photographers have encountered needless troubles because they didn't follow the directions. The users manual should contain information about configuring the software for your system. It also should provide

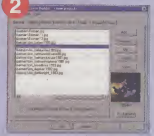
## Settings On Display

Some photographers complain that their digital images look vibrant and colorful on the camera display but washed out and dismal on the computer screen. This is most likely caused by a discrepancy between the camera's image-capturing capabilities and the computer's display settings. For the best viewing of electronic images, your computer must be configured to display at least as many colors as the camera captures.

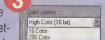
**To reset the graphics display settings in Windows:**

1. Right-click the Windows Desktop. A pop-up menu will appear on-screen. Click Properties.

2. The Display Properties dialog box will appear on-screen. Click the Settings tab.




3. Look at the Color Palette setting. This should be set at least to the 16-bit High Color option, or preferably to the 24-bit True Color option. If it isn't, change the setting to one of these two options. (Refer to the users' manual that came with your graphics card to learn whether the card supports 24-bit true color.) Make the change and click OK.




4. A warning message may appear on-screen at this time, prompting you to restart your computer. Click OK, and your computer will restart automatically.

5. When the computer restarts, the new display settings will be active.

step-by-step instructions for downloading images from the camera to the PC. Reinstall the software as a last resort.

**Problem:** When I connect the camera to a serial port, I always seem to get a "port busy" error message.

**Solution:** This error indicates a conflict between two or more devices (one of which is the digital camera) trying to use a single serial port. The first thing to do is reboot the PC to see if this will clear the conflict. If that doesn't work, you must identify what other device is tying up the serial port and then disable it. If it's your PDA (personal digital assistant), for example, then you should right-click the PDA's icon in the Windows Taskbar and select Close or Disable from the resulting pop-up menu.

**Problem:** My photo-editing application won't recognize my digital camera.

**Solution:** If the camera is properly connected to the computer, then this problem is most likely caused by an outdated driver. Visit the camera manufacturer's Web site and look for the latest driver. You'll probably find it in the site's "support" area. Such a driver should enable your camera to communicate with the photo-editing application.

**Problem:** The PC and photo-editing application recognize my camera, but I can't drag digital images from the camera to the photo-editing application.

**Solution:** The easiest way to get images from the camera to your photo-editing application is to use the **drag-and-drop** technique. This four-part technique involves positioning the on-screen pointer over the file you want to move, pressing and holding down the left mouse button, using the mouse to move the file to the destination folder, and then letting go of the mouse button.

Many photo-editing applications support this technique, but yours apparently does not. To get your image files into the photo-editing application, you must use the Import or Acquire command (or something similar). Refer to the users manual for instructions on importing data into your photo-editing application.

**Problem:** Digital images look fine on my camera, but appear blocky when I print them.

**Solution:** This problem indicates a discrepancy between the camera settings and printing capabilities. As you know, digital images are a combination of dots. When the dots are very small, the image looks sharp and clear. When the dots are big, however, the image looks blocky. Digital photographers must ensure that they capture enough dots to produce sharp images, but not so many dots that they end up with immense image files (remember, each dot consumes several bytes of storage space).

**Even though the SmartMedia (left) and CompactFlash (right) memory cards resemble each other, they're not interchangeable. You will run into problems if you try to use the wrong storage media in your digital camera.**

The number of dots that go into an image is measured as its **resolution**. For optimal print quality, you should set your camera to capture images at a resolution of 1,024 x 767 pixels for 3- x 5-inch prints; 1,280 x 960 pixels for 4- x 6-inch prints; and 1,600 x 1,200 pixels for 8- x 10-inch prints. Set the camera for a minimum resolution of 640 x 480 pixels for images you plan to publish online.

Unfortunately, not all cameras are capable of capturing such high-resolution images. To determine what resolutions your camera supports, look at the camera's megapixel rating. Cameras with a megapixel rating of one or less are limited to taking pictures with a resolution of 640 x 480 or lower. Cameras with a megapixel of two or less are limited to pictures with a resolution no higher than 1,600 x 1,200. Cameras with a megapixel rating of three or more are capable of taking pictures that have a resolution of 2,048 x 1,536 or higher. Such resolution is necessary for printing 11- x 13-inch photos.

**Problem:** My close-ups look blocky when viewed on my computer.

**Solution:** You need to use optical zoom instead of digital zoom. Optical zoom actually involves the use of a special lens to get a closer look at the objects you see in the viewfinder. Digital zoom, on the other hand, is basically a software trick that inflates an image to look bigger. The only way to achieve decent close-ups is to use optical zoom.

A good way to tell the quality of a camera is to check whether it supports optical zoom. Most cameras, even the cheapest of the low-end models, support digital close-ups, but optical zoom is found almost exclusively in quality products.

**Problem:** My photos look darker on my computer monitor than they did on the camera's LCD screen.

**Solution:** There is no solution for this; it's merely an idiosyncrasy of digital cameras. As you take pictures, you'll learn to compensate for the small difference in brightness.

**Problem:** My pictures don't turn out the way I want them to. Some are overexposed; others are underexposed.

**Solution:** The camera probably failed to account for anything other than ideal lighting conditions. The best way to beat this problem is to acquaint yourself with the camera's manual exposure or light-sensitivity settings, says Lisa Graham, product manager of digital cameras at Epson.

"There are so many options available to adjust the outcome of your digital images," Graham says. "Unfortunately, a lot of people are not familiar with those options. Becoming familiar with them is one way to improve your pictures." As a rule, you should use the manual settings when shooting in extreme lighting conditions, such as strong backlights or heavy shading.

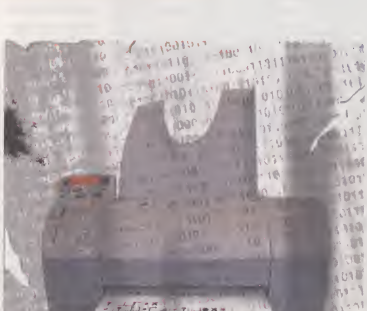
Alternatively, if your camera doesn't have such manual settings, then you can try to correct the exposure problems by manipulating the brightness levels in your photo-editing application. Refer to the users manual for instructions on using the various editing controls.

■ **Aim To Please.** For all the problems that we've mentioned, the odds of encountering any significant snags during your use of a digital camera are low. Indeed, you should be able to snap photos without a care in the world as long as you read the users manual, take advantage of USB (Universal Serial Bus) connectivity, keep some extra batteries on hand, and perform simple camera maintenance tasks such as routinely formatting the storage media and keeping the lens clean. Now that's something to smile and say "cheese" about. LS

*by Jeff Dodd*

# Inkjet Printers

## Tips To Solve Your Printing Problems



Often when inkjet printers act up, the fix is simple: secure a loose cable or power cord, check for paper jams, clean printer nozzles, replace ink cartridges, or turn the printer off and back on so it can revert to the settings that keep it humming. Sometimes your printer will even tell you where it hurts, communicating with blinking warning lights. Then you just consult the printer manual to see what those lights mean and what to do about them.

Sometimes problems are more complex and require a rudimentary understanding of how your inkjet printer works. To create images and text on a page, the inkjet printer sprays ink through little nozzles as print heads move across the page. The ink, usually three or four colors plus black, comes in disposable cartridges.

A printer is a peripheral device, which means it can't operate as a standalone machine but depends on a computer. The printer connects to the PC via a cable, which is how the printer gets its instructions to print a file. But the computer and printer can't communicate until a printer driver is installed. You will probably find that software listed in the Microsoft Windows Add Printer Wizard when you install the computer. If not, you can install the driver from a diskette that came with your printer or download a driver from the printer manufacturer's Web site. The driver acts as an interpreter so your PC and printer can communicate.

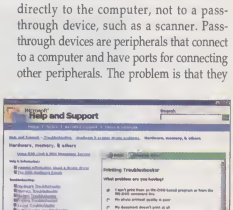
Finally, your printer must be configured properly. Following the instructions in your printer's manual, go to the Start menu, choose Settings, and then click Printers. Right-click your printer's icon and click Properties. Make sure these properties conform to your printer's specifications. At the same time, make sure the printer is set as the default printer and set for the correct port, usually LPT1.

Troubleshooting can involve everything from the printer to paper stock, ink cartridges, cables, power source, PC, software, and configuration. Here are some of the more common problems and troubleshooting advice.

■ **Noisy Printer.** Loud noises, such as the sound of an industrial strength can opener, may mean a trip to the repair shop. But less alarming noises probably mean the print head carriage, which is supposed to glide smoothly from side to side across your paper along a track, is being impeded. That's because over time, the lubrication dries out, and cat hair, dust, and what-have-you accumulate. Resist the urge to attack the problem with a can of compressed air, which can force dirt further into sensitive mechanisms. In fact, don't even try to clean and lubricate the track without consulting your printer manual or the manufacturer's Web site. It may be a job best left to a service technician.

**Nothing will print.** We've all run into this problem before. You need a document, but your printer won't print anything. Try printing a diagnostic test page? (If there's not a test button on the printer, your printer's manual will tell you how.) If the test page won't print, the problem could be the power supply or printer hardware. If the test page prints, the problem could be the cable, printer driver, or improper configuration.

1. Check your printer manual's cable specifications. It probably calls for a bi-directional IEEE 1284 compatible data cable that lets your computer and printer talk to one another. The cable should be connected directly to the computer, not to a pass-through device, such as a scanner. Pass-through devices are peripherals that connect to a computer and have ports for connecting other peripherals. The problem is that they don't support bi-directional communication essential to run your printer. Some printers specify the newer USB (Universal Serial Bus) cable.
2. You may have a damaged printer driver (software that enables your printer to work with your computer and operating system) or, if you've just upgraded to Microsoft



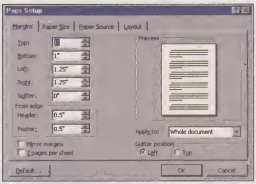

**The Help feature in Windows Millennium Edition has a Printing Troubleshooter where you can get solutions for specific problems. It will also run a diagnostic to see if your printer's settings are causing the problem.**

Windows 98 or Windows Me, the new operating system doesn't recognize your printer's old printer driver. Use the Add/Remove hardware feature in the Control Panel. From the Start menu, select Settings, and then click Control Panel. Double-click Add/Remove Hardware and follow the directions. You may be prompted to install a driver from a diskette that came with your printer.

3. Make sure your printer is set as the default printer and directed to the correct port. LPT1 is the standard printer port unless you're using a USB cable, in which case the USB port should be selected. From the Start menu, select Settings, and then click Printers. Right-click your printer's icon. You should see a check mark next to Set As Default. Then click Properties in the same window. Click the Details tab. Make sure the LPT1 port, the standard printer port, is selected.

■ **Garbage.** If, when you print, you only get junk, check the cable to make sure it's securely connected. Next check the printer settings. From the Start menu, select Settings, and then click Printers. Select your printer's icon and verify it is set as the default printer by opening the File menu. There should be a check mark next to Set As Default. Then right-click your printer's icon and click Properties. Click the Details tab. Verify that the correct driver for your printer is the one showing in the Print Using The Following Driver window. If not, use the drop-down menu to select the correct driver.

If that isn't the problem, you may have a corrupted printer driver or one that is outmoded. You can reinstall your existing driver by clicking New Driver in the Details window and following instructions, but if you've had the driver longer than six months, a better solution is to look for an updated driver on the manufacturer's Web site. Usually new drivers are available for downloading at no cost.




**The Properties window is the place to indicate settings consistent with your printer manufacturer's specifications, make accommodations for non-standard paper, and choose the quality of output.**

■ **Selective Printing.** When you mean to print only one page, but the entire 47-page file prints, there is a way to stop the file from printing. From the Start menu, select Settings, click Printers, then double-click your printer's icon. Select the document and click Cancel. Your printer will stop printing once it has printed the pages already in its queue.

■ **Text Is Faded Or Non-existent.** Chances are there is a build-up of lint or dust, and you can fix the problem with a good cleaning. Then again, it may be the paper.

Good quality printing jobs are a marriage of ink and paper, and you're the matchmaker. The fancy paper stock you bought for invitations may not be compatible with your printer's ink, and you'll end up with smears or bleeding. Check for compatibility before buying. You may need to stick with your printer manufacturer's brand of paper stock.

**Smears and streaks.** You need your resume for a job interview, but it's covered with smears and streaks. How can this be resolved? It's inevitable that dried ink will build up and nozzles will clog, and Murphy's Law says the problem will manifest itself when you most need a clean document. You might be able to get away with just wiping dried ink off the cartridge nozzles with a damp cloth. Or you may have to do the whole cleaning routine according to your manufacturer's instructions. Your printer may have a device driver that unclogs nozzles by forcing ink through them at high pressure.

You can also avoid smearing by giving documents a chance to dry before stacking or handling them.

If that doesn't fix the problem, the paper you are using could be the cause. If you bought special paper for your resume, try using your regular paper stock.

Remember that your system will stay cleaner longer if you always shut it down properly. Turn it off from its own switch and let it go through its shutdown cycle before turning off your computer's master switch. This enables the printer to clean and park the print head, thus sealing it and preventing ink from drying on it.

**There are bands of black (or white) on the page.** The problem is that the ink, which is

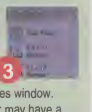
## Pesky Paper Jams

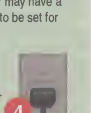
Recurrent paper jams may indicate paper problems. You may need to experiment with different paper stock. Even the right paper, if not stored properly, can curl, swell, or stretch and cause paper jams. Exposure to excessive humidity or careless stacking are usually the problems. Always:

1. Store reams of paper flat and unopened, and never directly on the floor.

2. To prevent sheets of paper from clinging together when feeding into the printer, fan the edges of a stack of paper before loading it in the paper tray.

3. When changing types of paper stock, such as from letterhead to multipart forms, it may be necessary to adjust settings in the printer's Properties window. Also, your printer may have a lever that needs to be set for thicker stock.




4. When a jam occurs, turn off the printer and unplug the power cord.

5. Open the cover and follow your printer manual's directions for removing trapped paper. Do not try to reuse wrinkled paper, as it will probably jam again. □

wet, is bleeding or is being improperly absorbed by the paper. As the print heads move across the page and apply ink, sometimes bands of ink overlap where they shouldn't, making a black band, or they fail to meet where they should, making a white band. Using the right paper can usually solve this. Thin white streaks usually indicate that a clogged nozzle needs cleaning.

## When All Else Fails

Have your printer's name and model number handy before seeking help. First, go to your printer manufacturer's Web site where you can get free technical support, download updated printer drivers, and obtain service center locations. You can also get help by phone, although there may be a fee. Here is contact information for popular brands of printers:

**Brother**
(800) 276-7746
(908) 704-1700
http://www.brother.com

**Canon**
(800) 828-4040
(714) 438-3000
http://www.canon.com

**Epson**
(800) 922-8911
(310) 782-2600
http://www.epson.com

**Hewlett-Packard**
(800) 752-0900
(208) 344-4131
http://www.hp.com

**Lexmark**
(888) 539-6275
(859) 232-2000
http://www.lexmark.com

**NEC Technologies**
(800) 632-4650
(630) 467-4363
http://www.nectech.com

**Okidata**
(800) 654-3282
(856) 235-2600
http://www.okidata.com

■ **Colors Aren't What They Used To Be.** The first thing to consider is that you've used up one of the basic colors the printer uses to mix a wide variety of colors. It's also possible that the colors have blended together inside the cartridge. This can happen if you've placed a cartridge into a plastic bag to keep it from drying out. If the nozzles touch the bag, the inks can bleed into different chambers within the cartridge. Try printing a few pages to see if the problem resolves itself. If not, replace the cartridge.

**If the text is out of alignment on the page, check the settings in Page Setup.**

If black ink is printing brackish green, you can probably fix the problem by changing a setting. From the Start menu, choose Settings, and click Printers. Right-click your printer's icon, then click Properties and click the Print Quality tab. Select the highest quality or Best setting and click OK. Click the Color Control tab, and select Automatic. Click OK.

■ **Error Messages.** If an error message tells you you're Out Of Paper when you're not or that there's an Error Writing To LPT1, the problem may be that you're using a USB cable and need to change the port setting. To change the port setting to USB, Click Add Port in the Details window of your printer's Control Panel.

■ **Sealing Envelopes Shut.** Some day this might be a value-added feature of printers. They'll take your invoices, fold them, stick them in envelopes, then feed the envelopes through the printer and seal them. But for now, it's a problem. Make sure you're using envelopes made for your printer. If the envelope isn't the problem, try accelerating its trip through the printer. Try these tips:

1. Don't use fancy graphics that take a long time to print.
2. Avoid using the highest print quality setting. From the Start menu, choose Settings and click Printers. Right-click your printer's icon, then click Properties and click the Print Quality tab. Select draft or normal mode and click the OK button.

■ **Printing Adjustment.** When you print a document, but it is not where you want it on the page, you have a few things you can try. First, check how the paper is feeding into your printer. Remove the paper from the tray, fan the edges a couple of times, and replace it in the tray.

Another possible cause for this problem is that you're printing from an application that's configured to use the wrong printer driver. Open the File menu, click Print, and check to see that your printer is the one selected.

If you've switched from one size of paper to another, you need to change settings in the Print dialog box. Open the File menu, click Page Setup, and make any necessary adjustments.

If you're trying to print envelopes, there's a special print command for Envelopes and Labels found in the Tools menu. Adjust the settings for envelope position, envelope size, and font type and size.

■ **Paper Doesn't Feed Correctly.** Printers sometimes balk and have to be hand-fed. You can coax it to print by placing one sheet at a time in the tray and gently nudging it. Some printers refuse to accept envelopes unless you feed them in this manner.

Make sure you're loading the paper properly. Don't mix different paper stock together. Fan the edges of a stack of paper before loading the tray to slightly less than full. Adjust the paper guides so they're sitting against the paper without being too snug. If you continue to experience problems, the rollers inside are probably out of alignment, which means a trip to the repair shop. LS

*by Leanna Skarnulis*

# Laser Printers

## Stop Producing Poor-Quality Printouts

Laser printers combine incredibly high print quality at an incredibly low cost-per-page, except when they stop working. Sometimes it is hard to troubleshoot problems with your laser printer and find the best solutions because it is hard to figure out what is wrong. In many cases, once you know what's wrong, you can solve the problem yourself at low cost. The following tips will help you pinpoint your problem and find a solution.

■ **Paper-Feed Problems.** A laser printer, as does any printer, relies on a reliable paper supply to do its job. Fortunately, most paper-feed problems don't stem from actual printer problems; they come from user errors you can easily solve.

**Loading the paper tray.** Incorrect use of the paper tray is a leading cause of paper-feed problems. If paper is not inserted properly into the paper tray, the paper pickup rollers can't pull the paper into the printer to start the process. Make sure that you have the paper completely inserted into the tray and that you have any paper hold-down mechanisms properly engaged.

**Paper handling.** Getting paper inserted correctly into the paper tray is a lot easier if you handle paper the right way on its short journey from the package to the tray. You should lightly fan the paper before you insert it into the printer tray to make sure it isn't sticking together. After you fan it, make sure you line up all the sheets together so they insert into the printer properly.

**Reusing paper.** If you are reusing the back sides of already-used paper for drafts, it's even more critical to make sure all four corners of your paper stack are squared away. You also should make sure the paper has cooled down before you print on the backside. Hot paper tends to wrinkle and jam the printer.

**Paper weight concerns.** Many laser printers use a curved paper path by default; heavy paper stock, transparencies, or labels sometimes have problems following the S-shaped or C-shaped paper path used by most laser printers. If you are planning to use anything other than normal 24-pound or lighter paper in your laser printer, adjust the printer to use a straight-through paper path. On many models, you can perform this task by opening the rear-output tray, which replaces the normal top-output tray.

To avoid jams and print-quality problems, be sure to check the paper and media specifications for your printer before you buy media or paper for your printer; you'll find this information in the printer's documentation.

■ **Fix Paper Jams.** Follow these two steps to make solving a paper-jam problem safe and efficient.

**Turn off the printer.** Laser printers, unlike computers, use potentially lethal high-voltage power internally, and they use a laser beam that could damage your eyes. Play it safe and turn off the printer before you open it.

**Know where to look for paper jams.** Paper jams can occur at any of the following locations: the paper tray, toner cartridge, fusing rollers, or output tray. To remove a paper jam at the paper tray, remove the paper tray to gain access to the sheet. To clear a paper jam under the toner cartridge, remove the toner cartridge, which is where the image from the toner cartridge is transferred to the paper. If the paper already has received the image, be careful as you remove it because the toner is not yet fused to the paper and will shake loose as you remove the sheet. To remove a paper jam from the fusing rollers, open the rear of the printer or turn the printer on and off a few times to advance the paper to where it can be pulled out of the printer. Be sure to remove any torn pieces of paper because they will cause new paper jams if you leave them in the printer.

**If you do not properly insert paper into the paper tray of your laser printer, it can cause paper jams. In this case, some of the paper is not tucked under the hold-down clip in the paper tray.**

■ **Toner & Toner Cartridge Troubles.** Most laser printers follow the lead of the original Hewlett-Packard LaserJet printer and use a toner cartridge that contains much of the printer's imaging equipment, including the drum. You can cure problems with toner on these printers by replacing the toner cartridge. Replacing the toner cartridge also solves many image-quality problems. Some of the typical toner cartridge problems include:

**Uneven print.** Laser printer toner cartridges are designed to print several thousand pages. When the toner supply gets low, some parts of each page will have lighter print or no print at all. Replace the toner cartridge to solve this problem (refill toner reservoirs on printers that use a separate imaging drum and toner supply). As a temporary workaround, remove the toner cartridge and gently rotate it back and forth to redistribute the remaining toner.

**Sharp black lines run vertically through each page.** The surface of the imaging drum (normally found inside the toner cartridge) is relatively soft; if this surface is scratched, all pages will have lines. Replace the toner cartridge or imaging drum.

■ **Fuser Failings.** The fuser is a set of heated rollers near the output tray on a laser printer. After paper receives the image from the toner cartridge or imaging drum, the toner lies loosely on the paper until it is secured in place by the paper's passage through the fusing rollers. Some typical fuser problems include:

**Fuser doesn't heat paper.** If the fuser doesn't heat the paper adequately, the image on the paper will not be stable; you can wipe it away with your fingers or blow it off the paper. A fuser that doesn't heat the paper properly may have failed. However, the problem may also be attributable to inadequate power available to the laser printer.

**Power problems and fusers.** Laser printers have a peak fuser amperage requirement, which varies by model. HP LaserJet printers, for example, have a peak fuser amperage requirement of as little as 2.8 amps or as high as 28 amps; most models require 10 to 20 amps. (See your printer's documentation to find out what its fuser amperage requirement is.) If your laser printer is plugged into its own circuit, there should be adequate amperage for the fuser to reach the correct temperature. However, if the laser printer is plugged into a surge protector or multioutlet strip with several other devices that are also on and use significant amperage, there may not be enough amperage to heat the fuser, although the printer itself may be able to advance paper and start the print process.

Before assuming the fuser has failed, check for a fuser error message on the printer status display. In addition, check the amperage rating of the circuit the printer is plugged into. If possible, put the printer on its own circuit with at least a 20-amp rating (30 for older units and units with duplex printing capability). If the problem persists, plug the printer directly into the wall to eliminate any problems caused by surge protection. If these options fail to improve fuser performance, your fuser has failed.

**Replace the fuser.** A fuser failure is a serious hardware failure that you can't fix by replacing the toner cartridge. You may be able to replace the fuser assembly yourself, but you should check the cost of a new or rebuilt fuser before deciding if the printer is worth repairing. You can obtain fusers for most printer models from the printer manufacturer. If you don't feel comfortable replacing this part, you may want to take it to a professional.

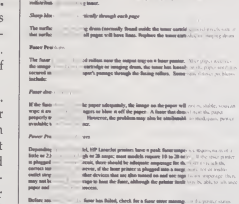
**Fuser leaves marks on the paper.** The fusing rollers can leave repetitive marks on the paper if they become dirty, but so can other parts of the printer. To determine which printer parts are causing marks on the paper, see the Image Quality section of this article.

■ **Image Quality.** A variety of things can cause image-quality problems. Here are a few of the most common.

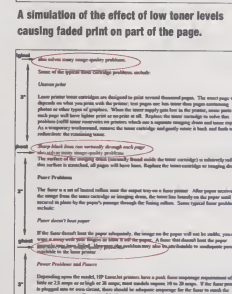
**Paper quality.** Extremely rough or extremely smooth paper or paper that is improperly stored will not work correctly in a laser printer and will cause poor-quality output. Check the smoothness rating of textured paper or very smooth paper against the recommendations for your printer, or try a few sheets before you buy a large quantity of such paper.

Store paper properly to avoid print-quality problems; damp paper, for example, will cause randomized image dropouts when used for printing. Keep paper in its original packaging if possible, and use up already-opened paper before opening another package.

**Debris on rollers in the paper path.** Laser printers use rollers to pick up, advance, and fuse paper during the printer process. Repetitive marks on each printed sheet can indicate that rollers are dirty or damaged or that the toner cartridge is dirty or damaged. To determine what is causing marks on your printouts, check with the laser printer vendor to get the specifications for the toner cartridge, fusing roller, and paper advance roller circumferences. Dirt, debris, or damage to a roller will result in a mark in the paper every time the roller completes a revolution along its circumference. Compare the distance between the marks with the circumferences of the rollers and toner cartridge parts to determine which component in the printer is marking the page. See the "Repetitive Marks" sidebar for details.



**A simulation of the effect of low toner levels causing faded print on part of the page.**



**A simulation of a dark ghosting effect; the same text is printed faintly every 3 inches due to a problem with the toner cartridge.**

**Ghosting.** If you see faint text or graphics markings on the page along with the image or text you expect to see, your page contains a ghost image. There are two main causes for ghost images:

1. **Developer starvation**, which is caused by printing an image that uses so much toner that there is not enough time for the **developer** (developer particles help the printer's charged rollers attract or repel the toner as needed) to pick up new toner and charge it sufficiently for the next image. This causes a problem known as **light ghosting**. To determine if the developer is the cause of light ghosting, check the developer circumference for your printer and see if the ghosted images are the same distance apart as the developer circumference. You can solve problems with light ghosting by making sure the printer is plugged into an adequate electrical circuit, changing the page layout to avoid placing grayscale images after black images, and

placing a black page into the document immediately before the page that has ghosting problems and printing both pages in the same print job.

2. Toner cartridge problems can also cause ghosting. If the ghost images are the same distance apart as the imaging drum in the toner, this is referred to as **dark ghosting**. To fix this, replace the toner cartridge.

■ **Error Messages.** More expensive laser printers often use LCDs (liquid-crystal displays) to indicate various problems with the printer. To determine details about these error messages, look up the code in your printer's manual.

Less expensive laser printers often use a cryptic series of signal lights instead of an LCD to inform you of problems. If the signal lights have symbols next to them, this can provide you with some clues to the problem. For example, if a signal light with a paper or paper-tray icon next to it is lit up, you probably need to add paper. To get additional details, you may need to press buttons on your printer to see a pattern of lights that you can decode to find additional information about the problem. Use your printer's manual or online help to determine the meaning of these signal lights.

■ **Garbage Printing.** To avoid garbage printing from any type of laser printer, follow these rules. First, make sure the printer is on and warmed up before starting the print job. If the printer doesn't receive the beginning of the print job, the printer will interpret the printer commands as text and print them. Second, use the correct printer driver. For example, using a PostScript driver or an inkjet printer driver with a printer that only understands HP LaserJet PCL commands will result in garbage printing.

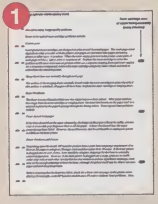
You also should check the printer cable at both the computer and printer end for proper connection and condition. A loose or damaged cable will cause garbage printing. In addition, check the LPT (line printer terminal) port configuration in the system BIOS (Basic Input/Output System). Even though the EPP (Enhanced Parallel Port) and ECP (Enhanced Capabilities Port) settings are much faster, printers that aren't designed to handle these modes may produce garbage output. Use the parallel port mode the printer was made for. *(NOTE: See "BIOS" in this issue for information on how to access the BIOS.)* LS

*by Mark Soper*

## Repetitive Marks

Laser printers can cause you a ton of frustration. One of the most trying problems you will encounter is what to do when every page that comes out of your laser printer has small marks at irregular intervals. To figure out what is happening, follow these simple steps.

1. Start by measuring the distance between the marks. Record this information. If there is more than one set of marks on the page, note the distance between all sets of marks.




2. Check the back side of the page for marks. Pages that have marks with the same spacing on both sides of the page have been marked by different components than those that have marks on only one side of the page. In this example, an examination of the page showed that only the front (print) side had repetitive markings; two sets of markings, in fact. One set was spaced 1 inch apart, and the other set was spaced 3 inches apart.

3. Check the printer manual or online documentation to determine the circumference of the toner cartridge components and rollers in the printer. One or more of these parts are marking the page. The printer in question is an Hewlett-Packard LaserJet 5P, and a trip to HP's Web site found the following measurements for rollers and similar components that could cause marks on a page:

- **Toner cartridge drum.** The circumference for this device is 3 inches. Problems with this will cause marks on the front of the printed page.
- **Developing cylinder.** The circumference for this device is 1 inch. Problems with this will cause marks on the front of the printed page.
- **Primary charging roller.** The circumference for this device is 1.5 inches. Problems with this will cause marks on the front of the printed page.

Replacing the toner cartridge will fix any of the preceding problems because the toner cartridge contains these parts. For the following problems, cleaning these rollers or replacing them can solve these problems.

- **Upper fusing assembly.** The circumference for this device is 3 inches. Problems with this will cause marks on the front of the printed page.
- **Transfer roller.** The circumference for this device is 1.75 inches. Problems with this will cause marks on the back of the printed page.
- **Facedown delivery roller.** The circumference for this device is 1.5 inches. Problems with this will cause marks on the back of the printed page.
- **Fusing pressure roller.** The circumference for this device is 1.875 inches. Problems with this will cause marks on both sides of the printed page.
- **Registration roller.** The circumference for this device is 4.6875 inches. Problems with this will cause marks on both sides of the printed page.

4. When we compared the distance between the marks on the page to the above information, it was obvious the developing cylinder, which is inside the toner cartridge, was causing the 1-inch markings. Either the upper fusing assembly or the toner cartridge drum, which is also contained in the toner cartridge, could be causing the marking at the 3-inch interval. After we replaced the toner cartridge, the markings at both distances were no longer present, indicating that toner cartridge drum and developing cylinder were both defective.

# Microphones

## Make Yourself Heard, Again

One of the benefits of Internet connectivity is the ability to communicate with anyone in a wide variety of ways. Using your computer's microphone to chat over the Internet is a great way to stay in touch, especially when the call is long distance. Along with the sound card, the microphone is an integral part of the chatting process. But if the microphone isn't working, the best sound card in the world won't do you any good.

■ **Simple Solutions.** Whenever troubleshooting computer problems, it is best to eliminate the obvious things first. Make sure you have your microphone plugged in to the Mic In port on your sound card. Most sound cards have three or four 1/8-inch jacks, but the microphone jack is usually marked with a symbol that looks like a microphone. It is easy to get the ports mixed up so double-check this.

Another possibility is the driver for your sound card is not installed correctly or it isn't the right one. You could have a situation where you can hear sound played back through your speakers, but things just aren't right for inputting sound with a microphone. On your Windows 98 or Windows Me PC, check your sound card's health by clicking the Start button, Settings, and then Control Panel. Double-click the System icon and select the Device Manager tab. Look for the Sound, Video And Game Controllers option and click the plus sign next to it. If your sound card is having trouble, you will see a yellow exclamation mark next to the card. You may have to reinstall your sound card driver to get everything straightened out.

To do this, highlight your card and click the Properties button. On the next screen, click the Driver tab and then the Update Driver button. From there, follow the instructions of the wizard.

■ **Sound Recorder.** If you are sure your microphone is plugged in and the sound card is functioning, a quick test is to use the Windows Sound Recorder application. To access it, click the Start button, Programs, Accessories, Entertainment, and then Sound Recorder.

To begin your test, simply click the red button on the right to start the recording process. As you speak into the microphone, you will see the green line respond to sounds it picks up. After recording a short bit, click the rewind button to start at the beginning of your sound clip, and then click the play button to hear it. This will tell you quickly if you need to adjust your sound card's **sampling rate** (the frequency at which the computer records bits of analog information) or input sensitivity.

If you need to make a change to the recording level of the microphone, there are two things you can do. The first is to increase or decrease the recording volume of the microphone. You can do this by clicking the Edit menu in Sound Recorder and selecting Audio Properties. Click the Volume button in the Sound Recording section. Here, you will find a variety of slides, including one for your microphone, which control different aspects of your recordings. Adjust them appropriately. (For your second option, see the sidebar below.)

If your recordings sound bad, you may need to adjust the volume controls for your sound playback. To do this, go to the Audio Properties dialog box, but this time, click the Volume button in the Sound Playback section. This opens up a control page that looks a lot like the recording volume dialog box. Here, you can easily drag any of the slider bars to make adjustments.

■ **Other Options.** Never underestimate the power of a reboot. Rebooting is always a good option if you're having microphone troubles. You also should check your system manufacturer's Web site and the site of the manufacturer of your microphone. You may find some online information that can help you solve your problem. If possible, try using the mic with another computer or another mic with your system; this will help you determine whether your microphone is broken, or if the problem lies elsewhere. LS

*by Keith Schultz*

## Microphone Boost

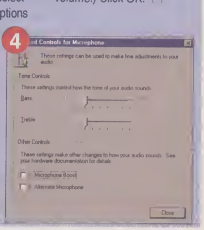
Unless you know your microphone is working 100% correctly, you can spend a lot of time and energy troubleshooting phantom problems. If you are picking up too much noise while recording, a simple solution is to turn off the Microphone Boost option.

**1.** Open the Volume Control utility by double-clicking the yellow speaker icon in your System Tray.

**2.** Open the Options menu and click Properties. Click The Recording radio button and click OK.

**3.** In the Recording Control windows, click the Advanced button in the Microphone section. (If you don't see the Microphone section, select Properties from the Options menu, click the Recording radio button, and then click the Microphone checkbox. Click OK.)

**4.** In the Advanced Controls For Microphone dialog box, you will see an Other Controls section. Uncheck the Microphone Boost option. (*NOTE: This will decrease the overall volume.*) Click OK.



# Software Solutions

## Applications That Will Protect, Repair, Optimize & Fix Your System

Melissa. Love Bug. Bubbleboy. These aren't terms most people associate with fear—usually. If you are a computer user, though, the meanings of these words frighten you. They should cause you to panic because the computer viruses and Trojan horses they represent ferret out victims and wound them in unspeakable ways. They might delete important files, rename or move existing ones, or even cause your entire system to become unusable.

As if an unwelcome virus weren't enough threat to our hapless computers, the actual units even seem to slowly self-destruct over time. We're not talking "Maxwell Smart" (this item will catch fire in 5 minutes here), but through ordinary use, computers cease to run well. Files become misplaced, corrupted, or fragmented. Attribute it to non-compatible software, sloppy installations, or simply normal wear and tear, but computers still need a few little fixer-uppers now and again.

When you combine a nasty virus with the naturally occurring glitches that race through any machine, you have a combination that can bring your work to a standstill. Minor malfunctioning you can live with, because often a simple reboot will knock a disrupted PC back into place. If you keep ignoring these little glitches, though, they can blossom into large-and-in-charge computer problems. When that happens, you need to call in the reinforcements.

■ **The Reinforcements.** Fret not; reinforcements abound. Many computer applications exist that will search and destroy viruses, straighten out the parts of your system that have gone askew, and lay down some protective framework for future pitfalls. Either you can buy symptom-specific software, such as an application that will eliminate viruses, or an all-in-one software suite that addresses everything that ails you.

The latter option is the most useful kind of package to use because it will attack viruses, remove unwanted files and restore needed ones, and repair a sick system. Why not fix everything at once rather than doing the job piecemeal? These packages don't need to damage your bank account while they fix your machine. Many are affordable or even free.

■ **General Cleanup.** Your first step in getting your computer in smooth working order need not be more difficult than picking up an all-in-one package and putting it on autopilot. Many problem-solving applications automatically scout your system for viruses or malfunctions. Two packages stand at the top of the heap when it comes to getting your computer into shape: Symantec Norton SystemWorks 2001 and McAfee Office 4.0.

Symantec's Norton SystemWorks 2001 (800/441-7234, 541/334-6054; http://www.symantec.com) is one of them. Symantec provides two versions of SystemWorks 2001, the standard and the professional editions, and both are comprised of three applications that address various problems:

1. **Norton AntiVirus 2001**—looks for and destroys viruses.
2. **Norton Utilities 2001**—optimizes your PCs performance and straightens up poorly running programs.
3. **Norton CleanSweep 2001**—obliterates unnecessary clutter on your hard drive.

SystemWorks Professional includes a few extras, which don't directly relate to the health of your machine, but they're nice to have. Either version combines the programs to seamlessly smack a system back into shape. The basic version costs $59.95 and the professional version costs $99.95. SystemWorks works on Windows 2000, Millennium Edition, NT, 98, and 95, and as soon as you insert the disc into your drive, it kicks itself

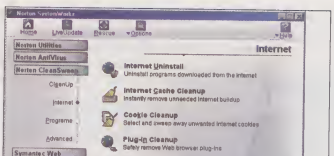
into action. The software uses something called One Button Checkup, which means after you install it, you simply click a button, and it spurs all the components of the program automatically.

(*NOTE: It's important to note that when you finish installing SystemWorks, you must remove your CD from your CD-ROM drive before you restart your computer. If you don't do this, it will automatically kick into emergency repair mode, which is an enormously time-consuming task. It will check and repair every single file on your machine. Generally, this is a good thing. It solves the problem of when your computer is so hopelessly in disrepair that you can't get into it to start your problem-solving software. The idea is you insert the CD, and it begins fixing before the operating system has a chance to load. However, when you simply want to start your computer, this can slow things down considerably.*)

McAfee Office 4.0 (800/332-9966; 408/988-3832; http://www.mcafee.com) is another good get-your-system-into-shape software package. It offers many of the same capabilities as SystemWorks, plus a few extra handy features for good measure. It comes with:

- **VirusScan**—for killing viruses.
- **Utilities**—for keeping your computer working at optimum levels.
- **UnInstaller**—for wiping out unwanted and unnecessary files.
- **Internet Guard Dog**—for protection against security breeches and crushing cookies.
- **Firewall**—for added protection against would-be hackers or snoopers.
- **PGP Personal Privacy**—for protecting the privacy of your e-mail messages and files through encryption.

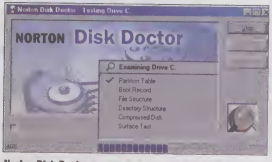
You can buy nearly any of these applications in this package separately on the market for $30 to $40 each, or you can save yourself a bundle by picking up the suite for $69.95. The application will run on various versions of Windows. (*NOTE: This information was not available at the time of this review because this product was not yet for sale.*) This program works in much the same way as SystemWorks does; you simply install the software by inserting the CD-ROM into your drive and following the on-screen directions. Then, it will immediately start hunting through your personal computer for viruses and inefficiencies.




**Norton CleanSweep searches your system for all redundant or unwanted files and destroys them.**

■ **Tune Up.** Installing one of these programs is a good first step toward getting your computer into working order, but you'll need to keep on top of your computer's health on an ongoing basis. You need to use one of these all-in-one applications on a consistent basis to keep your PC in good working order. The same goes for any problem-specific software you have.

Norton Utilities in SystemWorks is made up of smaller packages that address these optimization glitches. The programs find and fix computer problems, boost performance, and take over mundane tasks to prevent problems from happening in the first place. McAfee Utilities also cleans up messy systems with a similar set of tools. It does everything from letting you create PC-saving rescue diskettes, which you can use to save your information in case something irrevocably bad happens to your PC, to mundane tasks such as cleaning and backing up the Registry.




**Norton Disk Doctor scours your computer for ailments, and it will help you fix any problems it finds.**

**Fragments.** Often a problem is nothing more than just a sluggish computer caused by system **fragmentation** (inefficiently stored files). When the files on the hard drive become fragmented, files and bits of information become scattered around the hard drive. Regrettably, whenever you delete or add files to a computer, they fly around the system and slow things down. Defragmenting takes those scattered pieces and organizes them in a logical fashion to improve performance.

Every computer needs to be defragmented and tidied up from time to time, and you can do this effectively with a host of software. Both SystemWorks and Office will take care of this problem, although you can address it without spending a penny. DefragMentor Lite (http://www.defragmentor.com) is a free utility that defragments a single file or a group of files and gives you greater control over what you defragment and when. If you are running Windows, you also can use the Disk Defragmenter application. Click the Start button, Programs, Accessories, System Tools, and then Disk Defragmenter. (These instructions are for WinMe andWin98.)

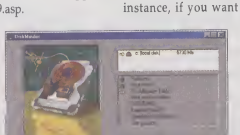
**Slow-loading programs.** If slow-loading programs are your problem, then you might want to try Launch Rocket, which is an interesting utility that is part of McAfee Office. You can use this application to trim down your system's start time. It rearranges the startup files so the operating system can access them faster and tells the operating system exactly where to read the files so it can start as soon as possible.

**Registry.** Another hotbed of computer problems is the Registry. The **Registry** is the operating system's database that stores information about its configuration. It might contain details such as profiles for the computer's users, what programs are on a system and their capabilities, property settings for folders, a record of what hardware exists, and many other important details. The contents of the Registry vary depending on the computer, but it's always vital information. Whenever you install or remove something from your machine, it deposits debris in the Registry. Over time, this unnecessary and sometimes corrupted information can clog your Registry.

To prevent this from happening, Microsoft provides a free utility called RegClean to clean out the Registry. You can download this

program from the Microsoft Knowledge Base at http://support.microsoft.com/support/kb/articles/Q147/7/69.asp.

Free programs such as this work fine in a pinch, but you might want to use a more powerful tool to get your Registry in working order. SystemWorks has a Registry Management tool that lets you edit the Windows Registry. You can also use the Registry Tracker to fix problems that might have occurred with the Registry. McAfee Office has Registry Wizard and Registry Pro that help in the same way. The wizard walks you through the process, and Registry Pro has a manual option for more experienced users.



**Use McAfee DiskMinder to optimize performance on your personal computer.**

■ **Defend & Protect.** If you are interested in more than just optimizing your system, for instance, if you want to fortify it against future snares or to find and fix some unknown problem that is causing it to crash, then use Office's Repair And Recover and Prevent And Protect features. Utilities in these categories, such as Safe And Sound, McAfee Image, Rescue Disk, and Crashpro, create backups of important files and check for the roots of problems.

SystemWorks has some similar programs. For instance, if you accidentally delete a file or if it becomes so corrupted that you can't fix it, you can use the Image tool to make repairs. It makes a copy of the way your computer was when it was in full working order so it can easily restore it to its former state. The Find And Fix Problems button will start Norton System Doctor, which monitors your machine for potential hazards. Other options that help your computer work better are UnErase Wizard, which retrieves missing files; Norton Disk Doctor, which repairs problem files; and Norton WinDoctor, which deals specifically with problems with Windows.

The shareware program AntiCrash from Dachshund Software (http://www.dachshundsoftware.com) lets you recover crashed applications and files and helps you to prevent crashes from happening again. It scans the drive for problem areas and attempts to fix programs that keep causing your system to fail. It also saves you from restarting your computer every time an application crashes. You can buy the full version for $26, and it runs on Win95, 98, NT, and 2000.

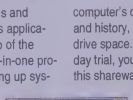
■ **Cleaning House.** Some problems come from the tremendously large programs that run on today's computers. Not only are they large but they also infiltrate your entire computer and share files with other programs. When you install a program, it scatters its contents across many folders, making it difficult to eliminate all those files when you want to uninstall it. This results in redundant files, obsolete files, and abandoned programs. These unused files are referred to as **orphans**.

Those are just the elements that junk up your system when you're running everyday programs. Add the Internet to the mix, and you have a heap of files that take up even more space. Some files, such as **cookies**, are the kinds of things you might not want on your system. Web sites place these small data files on your computer to carry information about you back to the Web site you're visiting. Sometimes cookies contain nothing more than your login name and password, but other times they follow you around as you use the Web and tell advertisers what kinds of activities you do there.

Eventually all these superfluous files will cause you to run out of hard drive space if you don't do something about them. You can't possibly delete all the unnecessary or infrequently used programs and files by yourself. Windows comes with an uninstall tool that purports to do this task, but it's far from effective. Luckily, you can find an abundance of programs that find these files and either compress them or

## Problem Solvers

McAfee.com's and Symantec's applications are just two of the more popular all-in-one programs for cleaning up systems and detecting viruses. They're both relatively inexpensive, especially considering how much grief they save, and they're worthy purchases. However, you can find many other similar products that also will help you troubleshoot your personal computer.



**Window Washer is a great little program that will help you free up some of your hard drive space.**

**Window Washer.** This application from Webroot Software (800/772-9383, 303/442-3813; http://www.webroot.com/washer.htm) automatically flushes out a computer's cache, cookies, and history, to free up hard drive space. After the 30-day trial, you must register this shareware program for $29.95.

**Cool Cleanup 2000.** This application seeks out files that are seldom used, take up large amounts of space, or are duplicates, and lets you remove them. This product is from PopovTech (http://members.nbci.com/ptlab) and you can purchase this shareware for $19.95 after the free trial.

**CPR 2000.** This program from SmartPCI (http://www.smartpci.com/cpr2000/index.html) increases system speed by optimizing how your system runs programs and caches files. This shareware application is $24.95 if you decide to keep it.

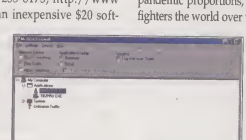
**Release RAM.** This handy application (http://www.releaseram.com) clears up wasted hard drive space by freeing up RAM. This is a shareware application, and it costs $15 to register the program.

**Trojan Remover.** Simply Super Software (http://members.aol.com/simplysup/tremover) provides a 30-day free trial of this shareware. This program rids your computer of Trojan horses when other antivirus software fails. Registration of this program costs $24.95.

**SurfinGuard.** Finjan Software (888/346-5268, 408/324-0228; http://www.finjan.com/surfinguard) provides this free software that watches executable programs for malicious behavior and kills viruses it finds.

just throw them out, depending on the file and what you tell it to do.

Silicon Prairie Software's MemTurbo II (800/242-4775, 612/253-8175; http://www.memturbo.com) is an inexpensive $20 software package that takes care of the job admirably. This software creates space by defragmenting the hard drive, taking RAM from applications that don't need it or that are wasting it, and makes better use of functions such as file caching. It will also find and get rid of files your computer doesn't need, creating more room for new files.



**The McAfee Firewall software keeps intruders from breaking into your system and gaining access to your personal information.**

Norton SystemWorks comes with loads of nifty tools to keep you working cleanly and efficiently, but one element that especially helps eliminate problem spots is Norton CleanSweep. This tool will guide you through removing unwanted elements on your computer. You don't even have to worry about accidentally removing something you want; CleanSweep automatically creates backup files of everything you eliminate in case you get rid of something you need.

McAfee UnInstaller, which is part of Office, removes old and unused programs by identifying and wiping out all the junk that appears on your computer. Just choose from one of the many options to uninstall unwanted programs, delete files, and seek out space-consuming orphans.

■ **Antiviral Medicine.** If only orphaned files were the root of all computer ills, then maintaining a smoothly running computer would be simple. Unfortunately, viruses are the greater evil for personal computers. Viruses can penetrate your computer through diskettes and even through e-mail. A **virus** is a small program that wriggles its way into your computer and disrupts the normal events that occur in your system. By definition, a virus also attaches itself to another program and replicates itself.

How a virus disrupts your computing is as varied as the kinds of viruses out there. It might change or replace files, trigger an event, or cause programs to cease running. These are the most damaging sorts. However, not all viruses are that malicious. Many are simply stupid and annoying. They might not damage your computer, per se, but they can be a real pain.

In an effort to keep viruses from reaching pandemic proportions, there are teams of virus fighters the world over who are working around the clock to find new strains and come up with the antidotes. These antidotes are placed in virus-killing applications.

The star of the Office suite of programs is VirusScan, widely considered one of the best options on the market for finding and eliminating intruders. VirusScan seeks out unwelcome visitors in diskette, Internet downloads, e-mail attachments, Intranets, shared files, CD-ROMs, and online services. As soon as you install the software, it goes through the bits on your system to find viruses. Then it begins running in the background so you don't have to worry about anything sneaking onto your computer. Office automatically downloads information about new viral threats when you are online so it keeps up-to-date on the latest viruses.

**McAfee Office provides all sorts of tools for getting your computer up and running when you run into snags.**

You can start a virus-scanning session by selecting VirusScan from the main McAfee Office window. Then select the Scan button to get started. The rest is self-explanatory; you simply select what you want to have scanned and click the Clean button to begin. The default settings on VirusScan will cover just about everything you can imagine you need scanned, plus some, but you can change what it watches by pressing the Settings button.

Norton AntiVirus in SystemWorks is also tops at extinguishing bugs from computers. Using Norton AntiVirus is simple because all you have to do is accept the preset options to ensure the safety of your computer. It automatically scans your computer for bugs, including boot records (which are in charge of starting the operating system) and all your files. But it never stops working because it checks programs for viruses as you use them, scans local hard drives once per week for infections, and it keeps an eye on the whole computer for any behavior that looks suspicious. It will also look through files you download from the Internet and will scan diskettes when you use them.

AntiVirus is a tool you want to keep on alert constantly, and you may want to run it manually on a regular basis. If, on the main SystemWorks screen, you want to see the current state of your machine, click the System Status button under the Norton AntiVirus section. You'll see a display of trouble spots and a summary of when AntiVirus last scoured the system. Like VirusScan, Norton AntiVirus downloads information about new viruses, including definitions of what they are, how they work, and how to handle them.

Trend Micro's PC-cillin 2000 (949/387-7800; http://www.antivirus.com/pc-cillin) is a $30 program that kills viruses easily and cleanly. It has a friendly Scan Wizard that takes you through the steps of finding and exterminating viruses, and the Scan Manager lets you set up automated scanning. This means you do not have to remember when to look for viruses or where, and the Antivirus Advisor handles automatic downloads of updates so your computer is even prepared to battle new problems.

■ **Maintenance Moves.** Of course, the best prevention against viruses is to watch what you download and to be wary of e-mail attachments. If it comes from a stranger, don't open it, and if it comes from a friend but looks suspicious, then get rid of it. Certain computer problems, such as fragmentation and misplaced files, have no preventative cure aside from downloading and regularly using such software as listed above. If you keep up on the things that can bog down your system, then you'll maintain that new-computer feel. In time, you'll learn never to fear the word "Melissa" again. LS

*by Monique I. Cuvelier*

# Tech Support From Manufacturers

## How To Get Help When You Need It The Most

Like death and taxes, technical support is inescapable. Hardware breaks. Software is incompatible. Manuals are incomprehensible, and, every once in a while, you just might want some advice.

Naturally, a company that fails to support its products is not worth dealing with. But it pays to be smart about getting support. There are steps you can take to make sure the process is a smooth one, saving everyone involved time and money. Remember: Most vendors genuinely want to help you, but you, in return, need to help them do it.

**Back At Step 1.** Before you even purchase your product, research the company. Anticipate that you'll have questions down the road, and imagine the ways you might seek assistance.

"Consumers should look at how many methods of access they have to a particular company," says Ray Quinto, director of customer care for music software company and Diamond offshoot RioPort (http://www.rioport.com). "If I only see an e-mail address I can use to contact the company, I'll think twice. I want a phone number, whether it's toll-free or not. And do companies offer online knowledge bases and frequently asked questions I can explore first without spending any money?"

In the case of software, Quinto urges would-be buyers to examine the application and explore its help options. Additionally, many vendors are now integrating live text chat (and even on-demand videoconferencing) into their support Web sites, giving customers even more ways of achieving fast results. Research all of these paths and make sure help will be available in a form that's convenient for you. To make sure, try calling the support line or starting a chat session and see what the wait time and quality of service is like.

**Plan Ahead.** When you make your first call to a vendor for support, odds are the person on the other end of the line doesn't know a thing about you or your problem. Most support topics are not black and white. They require a careful, logical question-and-answer process in order to reach a solution. This process hinges on you supplying accurate, helpful information.

"Give lots of detail," stresses Al Price, owner and creator of the Microsoft Outlook backup utility Outback Plus (http://www.ajsystems.com). "We get requests saying 'my program stopped working.' This just makes it slower for everyone. The user should give as much detail as possible—program names, version numbers, and the *exact* wording of any error messages."

RioPort's Quinto suggests that users become familiar with pressing ALT-PRINT SCREEN on their keyboard and using this command to capture error messages so they can be saved or pasted into an e-mail message to send to support representatives.

Nearly all customer service representatives agree that there is a virtually fixed set of basic information that you should collect before contacting support personnel. Don Campbell, tech support group manager for prominent modem manufacturer Zoom Telephonics (http://www.zoom.com), offers the following list:

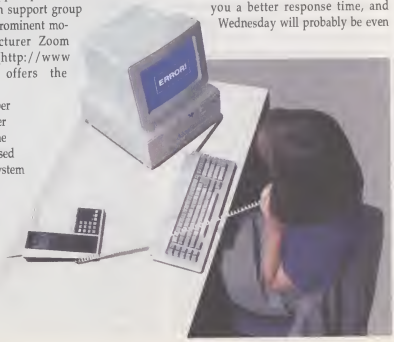
- Model number
- Serial number
- Product name
- Date purchased
- Computer system that it is installed on
- Operating system

Pay special attention to the way in which you present these last two items. Telling someone "I have a Dell machine" accomplishes almost nothing. Vendors may need to know the processor type and speed (such as, an Intel Pentium III 800MHz), the amount and type of RAM (128MB of SDRAM, for example), the chipset on your motherboard, and perhaps even the make and model of your hard drive. Most support sessions won't require this level of detail, but it can happen, and this is all information that should be included in your system receipts and documentation to begin with.

As for the OS, you may need to know that, for example, it's not just Windows 95, but Windows "95B," or Windows Service Release 2. You can generally find these version numbers by clicking Settings, then Control Panel from the Start menu, double-clicking System, and selecting the General tab.

In addition, consider when you will call for help. Most people's first impulse is to pick up the phone as soon as a problem is identified, which may not be the best idea if time is an issue. Companies that offer 24/7 support tend to have reduced support staffs on weekends, and since midday on Saturdays and Sundays will be the busiest times, it's best to aim for early mornings or evenings when making your phone call to increase your odds of finding an available representative.

If your vendor doesn't offer weekend support, then expect Mondays to be the time when everyone calls in with problems from the weekend. Tuesday is more likely to show you a better response time, and Wednesday will probably be even

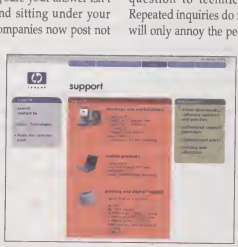


better. Friday starts to take another downturn as many procrastinators try to fix last-minute glitches before the weekend.

■ **Help Them Help You.** The old cliché about life being a two-way street definitely holds true with tech support. The customers who tend to get the best, fastest service are the ones who make the technicians' lives easier. Sometimes this means resisting the urge to reach for the telephone and instead exploring more obvious options.

Outback Plus' Price notes the ubiquitous (and paraphrased) industry acronym RTFM: read the flippin' manual. Good support teams spend days—or even weeks—trying to make their documentation as comprehensive and user-friendly as possible. Do them and yourself the favor of making sure your answer isn't already written out and sitting under your nose. Similarly, most companies now post not only manuals, but also supplemental corrections, FAQs (frequently asked questions), support discussion boards, and much more at their Web sites, most of which will be easily accessible via a search interface.

Zoom's Campbell adds that Web sites are also useful for determining what types of support are available and the most current phone numbers and e-mail addresses, which may not be noted in an older manual.




**Hewlett-Packard (http://www.hp.com) is well-known for its customer-oriented approach to technical support.**

If you don't need an immediate answer to your problem (and you may not get one, anyway), most support crews now prefer to field questions through e-mail. This allows them the time to research and/or test out your query without having the pressure of making a spontaneous reply. While telephones may allow for clearer communication, e-mail may allow for clearer thought, and companies generally feel that any time within 24 hours is appropriate for an e-mail response.

When you first contact a support rep, you've begun a relationship of sorts. Until the question is resolved, it's this person's job to get to know you and your situation. At the beginning of a call, the rep will almost invariably ask for your name and phone number. This not only helps him or her begin an incident log on your case, but also ensures that you will be called back in case of a disconnection. Likewise, you should always make a note of the rep's name and, if possible, a direct extension and/or e-mail address. Without this, you may be forced to start dealing with a new rep on your next call and explain part or all of your situation again from the beginning.

Next, consider your mood when you call. "We get very few requests from irate users," Price says, "but being nasty does not get better or faster support. More often than not, the problem is self-inflicted." Negativity only impairs communications and helps no one.

Price also makes two suggestions for e-mailing support. First, don't e-mail the same question to technicians multiple times. Repeated inquiries do not improve results and will only annoy the people trying to help you. If anything, it forces technicians to slow down and see if there is new content in any of the messages. Second, when you engage in e-mail correspondence with a support rep, do not remove the prior portion of the message when replying. This old dialogue reminds the technician of what has been previously discussed (remember, you're not the only customer), and it also helps a new tech to step in and quickly survey what action has been taken.

If time equals money in your support situation, "consider using '900' pay service if it is offered," Campbell says. "Although you will pay a minimal per-minute charge, your call will usually receive priority treatment in either the speed in which it is answered, the quality/experience level of the technician handling the call, or both."

■ **And Then What?** In a perfect world, support calls would always be resolved within the first five minutes. (Come to think of it, there would be no support calls.) However, many calls cannot be tidily settled during the first exchange. The issue may require more testing by both you and the support reps, may need to implement a patch file and call back if it doesn't work, etc. The end of a support conversation is a critical time in ensuring that your question continues to be properly addressed.

"Always at the end of the call, you want to ask what the next steps are," Quinto says. "With all the customer service agents I've ever trained, you always have them set expectations at the end of the call. Who's going to do what, and when and how is it going to get done? And ask the customer service rep, 'When can I hear from you?' There should be some closure at the end of the call."

As mentioned earlier, most vendors will generate a case file for each new support request containing your name, contact information, and a description of the issue in progress. These files are assigned "case numbers" or "incident numbers." After you get your reps name and contact info, also ask for your case number. You may need it if you wind up talking to a new representative.

Some customers choose to create their own logbook for service issues. When push comes to shove and you need to prove that certain events did or didn't happen in order to claim your warranty rights or, even worse, win a lawsuit, the ability to produce a logbook filled with phone conversation synopses, printed e-mail correspondence, and any other communications is likely to help the burden of proof in your corner.

Of course, before matters get out of hand, you always have the right to ask for escalation. We've all fallen prey to bad support reps, individuals who were unhelpful in one way or another. Nothing says you have to remain stuck with these people.

"In almost any organization, the front-line person will be a generalist, sort of serving the masses," Quinto says. "But at any given point, if you're not getting an answer, you can always ask to speak with that person's supervisor, team leader, or just ask to have your problem escalated so you can speak with somebody else. Any good service organization always has escalation paths."

Usually, questions don't grow into full-blown problems until communications break down between you and the support organization you're contacting. But as long as you work with them in a calm, pleasant, methodical manner, your chances of obtaining quick, satisfying results are almost assured. LS

*by William Van Winkle*

# Glossary

**backward-compatible**—Computer hardware or software that works with older versions or standards. Backward compatibility is popular because it lets users upgrade systems and software gradually, rather than starting over from scratch each time a new version or standard is released.

**BIOS (Basic Input/Output System)**—A special piece of software built into most computers. BIOS routines control the startup process of the machines and other basic functions such as the keyboard, display, and hard drive.

**COM (communications port)**—Serial communications ports used to connect devices such as modems and serial printers to your computer.

**controller**—A device that manages the flow of information between a computer and a peripheral device by relaying information between them. Specific devices require specific controllers. A computer comes with controllers for standard components such as a keyboard and monitor, but expansion boards with additional controllers might be needed for other devices, such as scanners and other input devices.

**DMA (direct memory access)**—A means of transferring data from a storage device, such as a hard drive or a tape drive, to memory without passing the information through the processor.

**ECP (extended capabilities port)**—A parallel port standard developed by Microsoft and Hewlett-Packard for a high-speed port that allows communication back and forth between the computer and the peripheral.

**EPP (enhanced parallel port)**—A type of parallel port that looks like any parallel port with 25 pins and the same shape. However, it works twice as fast as the parallel ports that came on the original IBM PCs, and it transfers data back and forth between a peripheral device and a computer at the same time.

**FAT32**—A 32-bit version of the FAT (file allocation table), which is used to keep track of the contents of a diskette. FAT32 lets users store more data on hard drives and use bigger drives. The previous version of FAT, FAT16, used 16 bits to address clusters, which limited the size of hard drives to 512MB, or 2GB if the drives were partitioned into four 512MB partitions. FAT32 supports drives as big as 2TB (terabytes). FAT16 uses 32KB clusters to store data, while FAT32 uses only 4KB, thereby saving space. FAT32 also offers more reliability than FAT16 because it can use a backup copy of the file allocation table in case of a disk error or failure.

**IRQ (interrupt request lines)**—Communications routes within a computer reserved for carrying interrupt signals, which tell the CPU to halt its current task and await further instructions. Different computer components, such as modems, keyboards, mice, sound cards, and other devices, each have a special IRQ set aside for them to use. These IRQs are prioritized according to the importance of each device, so the most important interrupt requests are handled first. A low IRQ number means an important device will be able to override other devices.

**jumper**—An on/off switch, once extensively used on circuit boards to alter hardware configurations, that is composed of wires and a small metal piece. To turn the system on, the metal piece is placed above two of the wires, which connects the wires and makes the circuit complete. When the metal piece is removed from the two wires, the wires do not connect, thus the circuit is not complete and the system is off. Jumpers are found on devices such as CD-ROM interface boards, bus expansion boards, scanner controller boards, input/output cards, sound cards, graphics cards, modem cards (internal modems), and motherboards.

**LED (light-emitting diode)**—A special type of semiconductor that illuminates when an electrical charge passes through it. LEDs are usually red; manufacturers often use them for readouts on electronic devices such as alarm clocks.

**LPT (line printer terminal)**—A designation derived from the days of the CP/M (control program for microprocessors) and MS-DOS operating systems to identify parallel ports that connect computers to printers. DOS and Windows assign the names LPT1, LPT2, and LPT3 to the first three parallel ports installed on a computer.

**module**—An individual piece of hardware or software. In hardware, for example, there are DIMMs (dual in-line memory modules), memory chips commonly used in personal computers. In software, modules are parts of a program's code that handle a specific function. Breaking code into modules simplifies maintaining that code, so if there's a problem with an aspect of the program, it's easy to find that part of the code. It also makes reusing code easier.

**overclocking**—Changing a computer system's hardware settings so it runs at a speed faster than what the manufacturer rated it to run. Doing so is a dangerous way to increase system speed because it risks damaging the CPU and other parts of the computer's motherboard. It also leads to poor system reliability.

**patch**—A piece of code inserted into software to temporarily fix a defect. While most users do not consider a patch a shortcut or a shabby way to fix a problem, adding too many can make a program difficult to maintain. Programmers often create patches to fix problems and add features to a program during the timeframe when users are awaiting the release of a new version of the program that already includes the "patched" corrections and new features.

**POST (power on self test)**—A set of tests performed by a computer during its startup routine to make sure all of its components are working correctly.

**ribbon cable**—A thin cable that looks like a strip of duct tape, with wires placed side by side. These cables are the type used inside a computer to attach built-in drives and other components to the motherboard.

**shadowing**—The act of moving data from slower ROM to faster general-purpose RAM to increase performance. For instance, instructions for communicating with basic hardware peripherals may be in a ROM chip on the motherboard. By copying these instructions into system RAM, the system has much faster access to the instructions.

**switch**—A piece of a physical circuitry component that governs signal flow. Having the switch open allows the signal to flow through, while keeping the switch closed stops the flow and breaks the circuit connection.

**UART (universal asynchronous receiver-transmitter)**—The most common type of circuit used to connect modems and manage serial ports, converting bytes into serial bits that can be transmitted. The UART also converts incoming serial data into parallel data so it can be received.

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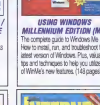


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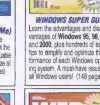


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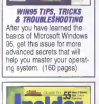


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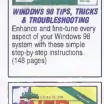


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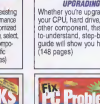


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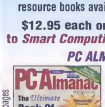


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